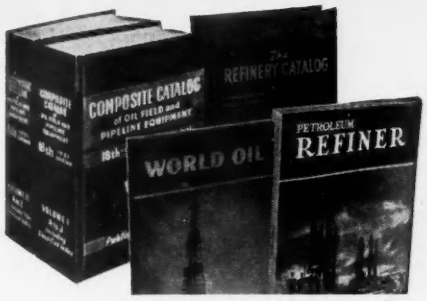


Specialized Oil Publications of
THE GULF PUBLISHING COMPANY
3301 Buffalo Drive, Houston 6, Texas
Box 2608, Houston 1, Texas
WORLD OIL and The COMPOSITE CATALOG
for the drilling-producing-pipe line industry
PETROLEUM REFINER and The REFINERY CATALOG
for the refining-natural gasoline industry

RAY L. DUDLEY, *President, Publisher*
A. L. BURNS, *General Manager*
WARREN L. BAKER, *Editorial Director*

EDITORIAL STAFF

WARREN L. BAKER, *Editor*
AL REESE, *Managing Editor*
L. J. LOGAN, *Associate Editor*
CECIL W. SMITH, *Statistical Editor*
J. E. KASTROP, *Production Editor*
W. B. COLVIN, *Drilling Editor*
DONALD M. TAYLOR, *Pipe Line Editor*
DON KLIEWER, *International Editor*

DISTRICT EDITORS

ROBERT E. SPANN, 250 Park Ave., New York 17, N. Y.
GILBERT M. WILSON, W. W. Wilson Bldg., Huntington Park, Calif.
ANTHONY GIBBON, Hunt Bldg., Tulsa 3, Okla.
MARION DENNARD RUTH THOMPSON
Editorial Assistants
MARY A. ZUBER, *Librarian*

ADVERTISING STAFF

TOM W. NELSON, *Advertising Manager*
ROGER MOTHERAL, *Eastern Advertising Manager*
250 Park Ave., New York 17, N. Y.
NELSON BIGELOW, 250 Park Ave., New York 17, N. Y.
BILL WESTFALL, 1010 Euclid Ave., Cleveland 15, Ohio
H. G. FITZPATRICK MARTIN HALLORAN
332 S. Michigan Ave., Chicago 14, Ill.
BILL ATCHESON, Hunt Bldg., Tulsa 3, Okla.
J. W. CURTS, W. W. Wilson Bldg., Huntington Park, Calif.
CHARLES WYATT DOUG CRAIG
3301 Buffalo Drive, Houston 6, Texas

CIRCULATION DEPARTMENT

R. M. DE SOMBRE, *Manager*

Single copies 50 cents (except special issues). Subscription price: domestic and foreign, $2 a year; 2 years, $3; 3 years, $4. WORLD OIL, published every month except semi-monthly in February and July. Entered as *The Oil Weekly* as second class mail matter December 23, 1916, at the post office at Houston, Texas, under the act of March 3, 1879. Advertising rates on application. Copyright, 1952, by The Gulf Publishing Company.

Indexed by Industrial Arts Index and Engineering Index

Did you know . . .

. . . that you can receive World Oil each month for only $2 a year? Why wait for a "pass along" copy when you can get a personal subscription for such a small amount. Send us your order today.

WORLD OIL

Established 1916 as THE OIL WEEKLY

CONTENTS

February 15, 1952 **Vol. 134, No. 3**

CURRENT OUTLOOK SECTION

Index to Statistical Tables and Charts ... 35
Editor's Page — *Warren L. Baker* ... 37
The Changing Panorama ... 39
Petroleum Demand Requires Greater Supply — *L. J. Logan* ... 42
Exports and Imports Trend to Be Restored ... 48
Petroleum Prices Under Pressure ... 50
Stocks of Oils at Desirable Levels ... 58
Legislative Outlook Calls for Industry Vigilance — *L. Dan Jones* ... 60
Oil-Using Units Have Sharp Growth ... 68
Steel for Oil Prospects Brighter ... 69

EXPLORATION SECTION

Exploration Reco[illegible] 20 Percent Above Previous High — *Cecil W. Smith* ... 73
Geophysical Crews Have Busiest Year ... 79
Prospecting Outlook Is for Continued Deep Drilling ... 80

DRILLING SECTION

Drilling Forecast Is for 1141 More Wells — *Warren L. Baker* ... 109
Completions and Footage Again Establish New Records ... 112
Rigs in Operation Average 7.2 Percent Increase ... 118
New Drilling Equipment Results from Continued Research — *Gilbert Rowe* ... 122
Contract Drilling Accounts for 90 Percent of U. S. Wells ... 134
Wells Completed Owned Mostly by Small Firms ... 138
Wells Drilled Largely by Rotary Method ... 138
Rig Ownership Largely in Hands of Contractors ... 140
Drilling Depth Records Established in Nine Areas ... 143
How to Do It—Drilling Hints ... 150

PRODUCTION SECTION

Artificial Lift Equipment for 22,441 Wells Is Forecast — *J. E. Kastrop* ... 169
U. S. Crude Production Due for Another Record Year ... 172
Natural Gas Expansion to Continue ... 180
Natural Gasoline Daily Output Passes ½ Million Mark ... 188
Petroleum Reserves Expansion Necessary ... 190
New Production Methods Promote Efficiency Despite Shortages — *J. L. Hoyt, Jr.* ... 194
Producing Depth Records Toppled in 12 Areas ... 202
Producing Oil Wells Hit History's Top Total ... 206
Refinery Operations Accelerated by New Construction ... 208
LPG Sales Advance Again — *K. W. Rugh and George R. Benz* ... 213
How to Do It—Production Hints ... 217

PIPE LINE SECTION

U. S. Pipe Lines to Be Hampered Again by Steel Scarcity — *Donald M. Taylor* ... 231
Crude, Products and Gas Lines Planned in 1952 ... 234
Principal Lines Under Construction ... 247
How to Do It—Pipe Line Hints ... 250

INTERNATIONAL SECTION

World Supply and Demand Increases 12 Percent Over Previous Year ... 257
World Crude Reserves Pass 100 Billion Barrels ... 260
World Crude Production to Rise Another ¼ Million Barrels ... 262
World Tanker Fleet Barely Meets Demand — *Benedict Saurino* ... 274
PAD's Foreign Program Encourages Increased U. S. Imports ... 280

DEPARTMENTS

Advertisers' Index ... 2
The Oil Man's Calendar ... 32
Men in the Industry News ... 284
Associations ... 292
Equipment and Service Suppliers' Notes ... 296
New Books ... 300
Squeaks from the Bullwheel ... 302

ADVERTISERS' INDEX

*Asterisk preceding name of advertiser indicates that detailed data on products and services of the firm will be found in current 18th (1951) edition of The Composite Catalog of Oil Field and Pipe Line Equipment.

A

*A-1 Bit & Tool Co. 265
*Acme Fishing Tool Co. 298
Acme Foundry and Machine Co. 254
Aero Service Corp. 275
*Aetna Ball and Roller Bearing Co. 287
*Ajax Iron Works 293
*The Aldrich Pump Co. 185
*Allis-Chalmers Manufacturing Co. 164-165
*Altens Foundry & Machine Works 308
*American Iron & Machine Works Co. 129
*American Manufacturing Co. of Texas 5
*American Sand-Banum Co. 228
*Axelson Manufacturing Co. 171

B

*B & W Incorporated 153
*Baash-Ross Tool Co. 67
*Baker Oil Tools, Inc. 38 and 268-269
Bank of Montreal 283
*Baroid Sales Division National Lead Co. 256
The J. B. Beaird Co. 285
*Beaumont Iron Works Co. 24
*Beaver Pipe Tools, Inc. 226
*Bethlehem Steel Co. 119 and 249
*Bethlehem Supply Co. 215
*Black, Sivalls & Bryson, Inc. 216
*S. R. Bowen Co. 271
*Bowen Company of Texas 273
*The Brewster Co. 89-90
Al Buchanan Drilling Co. 92
*Bucyrus-Erie Co. 26
*The Buda Co. 18
Burch Agate Torpedo Co. 228
Butler Manufacturing Co. 23
*Byron Jackson Co. 131

C

Cable & Staples 294
*Cameron Iron Works, Inc. 65 and 107
*Cardwell Manufacturing Co. 136-137
*Catawissa Valve & Fittings Co. 244
Caterpillar Tractor Co. 11
*The Cavins Co. 88
*Chicago Pneumatic Tool Co. 144-145
*Chiksan Co. 96
Chrysler Corp. 241
*Coffing Hoist Co. 242
*The Colorado Fuel & Iron Corp. 139
*The Cooper-Bessemer Corp. 237
Core Laboratories, Inc. 151
*Crane Co. 10
W. H. Curtin & Co. 294

D

*Detroit Diesel Engine Division General Motors Corp. 21
Diamond Bit Co. 292
Diamond Chain Co. 20
Dowell Incorporated 36
Dresser Industries, Inc. 168
*Drilling & Service, Inc. 161
*Drilling Equipment Mfg. Co. 302

E

The Eagle-Picher Co. 86
E. H. Edwards Co. 159
Eisenwerk Wuelfel 201
Empire Trust Co. 94

F

*Fluid Packed Pump Co. 211-212
*Foster Cathead Co. 98
*Fuller Co. 251

G

*Garrett Oil Tools, Inc. 209
*Gaso Pump & Burner Manufacturing Co. 229
*General Motors Corp. 21
The Geolograph Co. 152
Geophysical Service, Inc. 81
The B. F. Goodrich Co. 9
*H. P. Gott Manufacturing Co. 160
*Great Lakes Carbon Corp. 289
Great Southern Life Insurance Co. 14
*Grove Regulator Co. 63
*The Guiberson Corp. 307

H

*Halliburton Oil Well Cementing Co. 71 and 115
*Harrisburg Steel Corp. 102
*Herb J. Hawthorne, Inc. 85
Heldt Bros. Trucks 162
*Hercules Motors Corp. 295
*Hercules Tool Co. 306
*Hewitt-Robins, Inc. 104
Hinderliter Tool Co. Division H. K. Porter Co. 305
Houston Contracting Co. 238
Houston Laboratories 294
*Houston Ready-Cut House Co. 220
*Hughes Tool Co. IV Cover
*Hutchison Manufacturing Co. 158
Hyatt Bearings Division General Motors Corp. 30

I

Independent Exploration Co. 103
*Ingersoll-Rand Co. 246
*International Harvester Co. 29

J

*Jefferson Union Co. 166
*Jensen Brothers Manufacturing Co. 222
Johnston Testers, Inc. 178
*The S. M. Jones Co. 187
Jones & Laughlin Supply Co. 27
*Joy Manufacturing Co. 99

K

Kaiser Steel Corp. 253
*Kerotest Manufacturing Co. 254
Kerr-McGee Oil Industries, Inc. 147
*King Oil Tools, Inc. 100

L

*L & H Machine Works 162
*Lane-Wells Company 57, 167, 259, 304 and III Cover
*Larkin Packer Co. 177
*The Layne and Bowler Co. 225
*LeBus Rotary Tool Works, Inc. 279
*LeRoi Co. 182-183
Levingston Shipbuilding Co. 154
*Link-Belt Co. 3
Lone Star Cement Corp. II Cover
*Lone Star Tool Co. 160
Lucey Products Corp. 61
*Lufkin Foundry & Machine Co. 15

M

*Magnet Cove Barium Corp. 168
*Maloney-Crawford Tank & Mfg. Co. 203
*Manhattan Rubber Division Raybestos-Manhattan, Inc. 121
Marine Exploration Co. 105
*Jas. P. Marsh Corp. 195
*John N. Martin, Mfr. 152
Mayes Brothers, Inc. 230
*McCullough Tool Co. 303
*McEvoy Co. 199
*Mid-Continent Supply Co. 304
Milam Drilling Co. 301
*Miller Sand Pump Co. 220
*Mission Manufacturing Co. 33
*Lee C. Moore Corp. 133

N

National Bank of Commerce 12
*The National Supply Co. 51-52-53-54
*National Tank Co. 175
*W. C. Norris, Manufacturer, Inc. 205

O

O-T-M Supply Co. 267
*Oil Center Tool Co. 255
*Oil Well Manufacturing Corp. 299
*Oil Well Supply Division United States Steel Co. 8

P

*Page Oil Tools, Inc. 224
*Parkersburg Machine Co. 294
*Parkersburg Rig & Reel Co. 28
*Pelican Well Tool & Supply Co. 292
*Perforating Guns Atlas Corp. 156-157
Petroleum Distributing Co. 284
Petroleum Electric Power Association 193
*Petroleum Specialty Co. 227
Petty Geophysical Engineering Co. 93
Pewthers Ditcher Co. 247
Pittsburgh Coke & Chemical Co. 239
H. K. Porter Co. 305
Port City Cabinet Works 302
H. C. Price Co. 233

R

*Raybestos-Manhattan, Inc. Manhattan Rubber Division 121
*Rector Well Equipment Co. 221
*Rectorseal 162
*Reed Roller Bit Co. I Cover and 125
*Republic Steel Corp. 19
*The Ridge Tool Co. 300
*Rockwell Manufacturing Co. 13
*John A. Roebling's Sons Co. 31
The Royal Bank of Canada 286

S

*S & R Tool & Supply Co. 88
*Schlumberger Well Surveying Corp. 141
The Second National Bank of Houston 22
Seismic Explorations, Inc. 87
Seismograph Service Corp. 77
*Shaffer Tool Works 291
A. O. Smith Corp. 235
Smith-Donaho Contracting Co. 248
South Texas National Bank 306
Southern Engine & Pump Co. 226
*Spang & Co. 163
*Spencer-Safford Loadcraft, Inc. 245
*Sperry-Sun Well Surveying Co. 135
*Standco Brake Lining Co. 294 and 301
*Stewart & Stevenson Services, Inc. 16
*Sunshine Iron Works 288
Superior Iron Works & Supply Co. 95

T

*Technical Oil Tool Corp. 72
*Templeton, Kenly & Co. 166
Texas Electric Steel Casting Co. 17
*Texas Flange Co. 91
*The Thermoid Co. 127
*Thornhill-Craver Co. 281
The Torrington Co. 142
The Tripplehorn Co. 290
Trojan Construction Co. 248
*Tube-Kote, Inc. 223
*Tuboscope Co. 101

U

United Geophysical Co. 83
United States Steel Co. 8 and 34
*United Supply & Manufacturing Co. 243
*Universal Atlas Cement Co. 34

V

*Victaulic Company of America 32
*Visco Products Co. 7

W

*W-K-M Company, Inc. 197
Warren Automatic Tool Co. 154
*Waukesha Motor Co. 4
Waukesha Sales & Service Co. 155
*Weatherford Oil Tool Co. 148-149
*Web Wilson Oil Tools, Inc. 277
Welex Jet Services, Inc. 117
*Well Equipment Mfg. Corp. 297
Western Geophysical Co. 97
Western Inspection Co. 240
*Whitney Chain Co. 6
Whitney National Bank of New Orleans 296
Wichita Tool Repair Co. 166
*Wickwire Spencer Steel Division The Colorado Fuel & Iron Corp. 139
Williams Brothers 252
*Wilson Manufacturing Co. 111
*Wilson Supply Co. 218-219
World Oil 106
*Worthington Pump & Machinery Corp. 25

Y

*Yale Machine Works 301
The Youngstown Sheet & Tube Co. 108

Editor's Page

INCREASED DRILLING NEEDED

THE RECOMMENDATION by Petroleum Administration for Defense for drilling 55,000 wells in the U. S. during 1953 is an ambitious program, compared with the all-time peak of 44,826 wells completed in 1951. There is, however, a definite need for greater drilling activity, since there must be an immediate enlargement in oil discovery rates if this country is to have sufficient producing ability to fulfill growing consumption.

The need for such a large drilling program is substantiated by statistics published in this issue, WORLD OIL's annual Review-Forecast number. Large volumes of new oil continue to be found in the U. S. Doubling of wildcat drilling, together with a sharp growth in total wells completed, has boosted the nation's postwar oil discovery rates to the highest level in history. However, production rates have increased so sharply that the large quantities of new oil being found are not sufficient to maintain the relationship between unproduced reserves and current production.

Before the war an average of two barrels was found for every barrel produced, but the substantially larger postwar discovery volumes have been equal to only 1.5 barrels per barrel produced. Consequently, U. S. proved unproduced reserves at end of 1951 were only 12.5 times greater than the amount produced in the year, whereas in the years immediately preceding World War II reserves were 14 times greater than the then current rate of production. Production has increased so sharply that a total of 4 billion barrels of new oil must be proved each year to maintain the relationship of reserves with production. Ten years ago 2 billion barrels was sufficient.

• • •

WHILE THE NEED for drilling so many wells can be substantiated in many ways, the problem of getting such a large number drilled is a horse of another color, and depends upon many factors. Both the steel and the incentive must be provided.

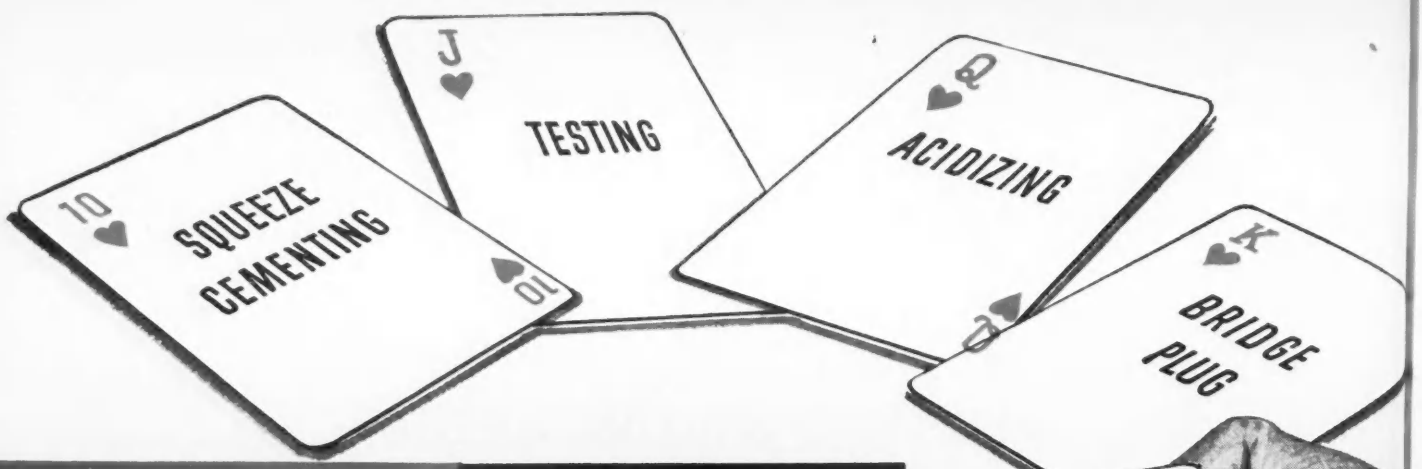
In addition to having enough steel made available to provide sufficient tubular goods, the industry will need more rigs, more bits, more engines and more of all the other numerous items and tools which make drilling operations possible. Furthermore, steel would be needed for valves, tanks and other production equipment.

There must also be proper incentives to induce contractors to buy the additional rigs required to drill so many more wells and to encourage operating companies and individuals to risk so much more of their income. The government now controls the industry's incentive factors, even as it controls the allocation of steel. For one thing, the government must assure the industry that its 27½ percent depletion allowance will be maintained. For another, the government must permit higher petroleum prices so as to correct a situation in which oil prices have not kept abreast of advances in operating costs.

• • •

PROVIDED THE INCENTIVES and steel are forthcoming, drilling can be stepped up to 55,000 wells in 1953 and beyond in future years. With an adequate oil supply so important to the civilian, industrial and military welfare of the nation, every assistance and encouragement should be given the industry.

Warren L. Baker



the right tool in the hole

There is no other tool you can use so effectively, so safely and so economically as the Baker Model "K" Cement Retainer (Product No. 400) for so many of the vital operations in your wells. It has truly proved a "lifesaver" for countless thousands of wells in such difficult work as squeeze cementing, testing, acidizing, or as a bridge plug—and it has even been used successfully to pick up and cement in position a lower section of a string of casing which had broken or backed-off.

SETS EASILY—HOLDS POSITIVELY The Baker Cement Retainer can be set accurately, readily and securely at any desired point. It maintains a leak-proof pack-off under any pressure which can safely be imposed on the casing, and permits placing cement, acid, or other fluids at any predetermined point behind the casing or liner; around the shoe joint; or into the open hole below.

READILY DRILLED UP Then, after the work has been successfully completed, the Baker Cement Retainer is quickly and easily drilled up, because the entire tool has been designed with a minimum cross-sectional area, so as to break up readily under the drilling bit—and construction of either Cast Iron or Magnesium Alloy further insures "drillability." Even the slips are segmented to break up readily into small, harmless fragments.

USED ALSO AS BRIDGE PLUG The Baker Cement Retainer can be converted into a casing bridge plug for setting on tubing, or better yet, on an electrical conductor cable. You can save wear and tear on precious tubing by calling your choice of the leading wire line service organizations—or ask any Baker representative or office for details.

BAKER OIL TOOLS, INC. HOUSTON • LOS ANGELES • NEW YORK

DON'T GAMBLE WITH THE MOST IMPORTANT WORK IN YOUR WELL—*USE THE "OLD RELIABLE"*

BAKER Model "K" CEMENT RETAINER

The Changing Panorama

1951-52

GROWTH, expansion, and increases were the rule in oil and gas industry operations in 1951, and they will characterize development again in 1952, forecasts indicate.

This is perhaps the most significant truth to be seen generally in the annual review-forecast material of this issue, covering the many different phases of the oil and natural gas industries.

The oil industry has been growing consistently for many years, and no interruption of its growth is in sight; even more vigorous growth has occurred in the natural gas industry in recent years.

Both industries provide highly desirable fuels at attractive prices, and both industries have to engage in ceaseless and vigorous expansion to keep abreast of the demand for their products.

In 1952 there must be further expansion of domestic production of crude oil, natural gasoline, and natural gas, despite some expected increase in imports of crude oil and refined products, to meet anticipated requirements of consumers.

Exports to Decrease

Exports of petroleum are expected to decrease materially in 1952, in absence of a repetition of the abnormal demand occasioned by shutdown of Iran's industry in 1951. But daily average domestic demand is conservatively estimated to show an increase of 7.1 percent, or nearly as much as the 8.3 percent gain recorded in 1951.

Despite the expected sharp drop in exports, to compare with a sharp increase in 1951, total demand for all oils in 1952 will show a normal increase of 5.1 percent, on daily average basis. In 1951, total demand was boosted by the abnormally high exports and showed the exceptionally large increase of 9.7 percent.

Because of lower exports, each of the major refined products will show smaller increases in total demand in 1952 than in 1951. Nevertheless, they will show increases. On daily average basis, total demand will be up 6.9 percent for motor fuel, 7.0 percent for distillate fuel oil, 5.4 percent for kerosine, 0.3 percent for residual fuel oil, and 4.4 percent for other oils in the aggregate.

To meet these requirements, U. S. refineries must run to stills 4.1 percent more crude per day than they did in 1951. Daily imports will be increased 8.3 percent, it is indicated, including gains of 7.7 percent for crude and 9.1 percent for refined products. In 1951, imports showed virtually no change from those in 1950.

After rising sharply in 1951, natural gasoline production is expected to increase again in 1952 by more than 5 percent.

Tentatively, no net change in stocks of crude oil or refined products is projected for 1952. However, if they should be increased by the same percentages as demand is expected to increase, thus maintaining the same number of days' supply in storage, there would be stock increases totaling about 31 million barrels. This would include 11.6 million barrels of crude, 8.6 million motor fuel, 5.8 distillate, 1.4 kerosine, and 3.4 other products.

More Production Needed

Even if stocks are not increased, domestic production of crude oil will be required at the rate of 6,336,000 barrels daily in 1952, an increase of 3 percent over the actual output of 6,149,000 daily in 1951. If the stocks of crude oil and products should be increased by about 31 million barrels, in line with the expected increase in demand, this stock building would require about 85,000 barrels per day additional crude production, or a total of 6,421,000 daily, which would be 272,000 a day, or 4.4 percent, more than actual output in 1951. Such a stocks buildup would be similar to, but a little less than, that which actually ocurred in 1951, when stocks of all oils were increased 33 million barrels, or an average of 91,000 barrels daily.

Prices of crude and products were frozen in late January, 1951, with crude at the same level that had prevailed since late 1947. The ceilings remain unchanged, although revisions are needed to cover increased costs in the industry.

Marketed production of natural gas increased 15.4 percent in 1951, with benefit of completion of substantial mileage of new gas pipe lines, and 1952 will bring more gas line construction and need for still more production.

Construction of crude and products pipe lines as well

as gas lines declined in 1951 because of the steel shortage, and pipe line work will be similarly handicapped in 1952.

More Wells, More Footage

Despite the steel shortage, the industry in 1951 drilled 3.5 percent more wells and 9.1 percent more footage than in 1950. The WORLD OIL forecast for 1952 indicates further increases of 2.5 percent in wells to be completed and 6 percent in footage to be drilled. The number of wildcats drilled in 1951 was up sharply — 23 percent, and a further increase of 10.1 percent is forecast for 1952.

More new crude reserves were proved up in 1951 than in 1950, it is estimated, and total proved reserves of over 26 billion barrels at end of 1951 showed an increase of 4.1 percent over those available at end of 1950. But the industry will have to prove up another 3¼ billion barrels of new reserves in 1952, as in 1951, if reserves are to be maintained on the basis of 12 years' supply at the current rate of annual production.

The U. S. had 479,095 producing oil wells at the end of 1951, an increase of 12,787 during the year. This was the net gain, while 23,179 new oil wells were completed,

Salient Annual Statistics of the United States

ITEM	THOUSANDS OF BARRELS, EXCEPT AS NOTED				
	1950	1951	Percent Change '50-'51	1952 Forecast	Percent Change '51-'52
Total Demand, All Oils	**2,483,119**	**2,724,018**	**+ 9.7**	**2,870,000**	**+ 5.4**
(Daily Average)	6,803	7,463	+ 9.7	7,841	+ 5.1
Motor Fuel Demand	1,018,997	1,133,208	+ 11.2	1,215,000	+ 7.2
(Daily Average)	2,792	3,105	+ 11.2	3,320	+ 6.9
Kerosine Demand	119,922	129,639	+ 8.1	137,000	+ 5.7
(Daily Average)	329	355	+ 8.1	374	+ 5.4
Residual Fuel Oil Demand	569,171	591,768	+ 4.0	595,000	+ 0.5
(Daily Average)	1,559	1,621	+ 4.0	1,626	+ 0.3
Distillate Fuel Oil Demand	407,276	471,249	+ 15.7	506,000	+ 7.4
(Daily Average)	1,116	1,291	+ 15.7	1,382	+ 7.0
Lubricant Demand	53,105	60,627	+ 14.2	62,000	+ 2.3
(Daily Average)	146	166	+ 14.2	169	+ 1.8
Domestic Demand, Total	**2,372,084**	**2,568,080**	**+ 8.3**	**2,757,000**	**+ 7.4**
(Daily Average)	6,499	7,036	+ 8.3	7,533	+ 7.1
Exports, Total	**111,035**	**155,938**	**+ 40.4**	**113,000**	**— 27.5**
(Daily Average)	304	427	+ 40.4	308	— 27.9
Crude Oil Exports	34,798	28,599	— 17.8	18,000	— 37.1
(Daily Average)	95	78	— 17.8	49	— 37.2
Refined Oil Exports	76,237	127,339	+ 67.0	95,000	— 25.4
(Daily Average)	209	349	+ 67.0	259	— 25.8
Crude Runs to Stills, Total	**2,094,867**	**2,371,168**	**+ 13.2**	**2,474,160**	**+ 4.3**
(Daily Average)	5,739	6,496	+ 13.2	6,760	+ 4.1
Demand for Crude, Total	**2,154,452**	**2,416,065**	**+ 12.1**	**2,512,976**	**+ 4.0**
(Daily Average)	5,903	6,619	+ 12.1	6,866	+ 3.7
Demand for Domestic Crude	1,978,035	2,233,751	+ 12.9	2,318,976	+ 3.8
(Daily Average)	5,419	6,120	+ 12.9	6,336	+ 3.5
Crude Production	**1,971,845**	**2,244,404**	**+ 13.8**	**2,319,000**	**+ 3.3**
(Daily Average)	5,402	6,149	+ 13.8	6,336	+ 3.0
Value at Wells, $ Thousand	5,028,205	5,745,674	+ 14.3	5,936,640	+ 3.3
Average Value, $ per Barrel	2.55	2.56	+ 0.4	2.56	.....
Imports, All Oils	**309,149**	**307,232**	**— 0.6**	**334,000**	**+ 8.7**
(Daily Average)	847	842	— 0.6	912	+ 8.3
Crude Imports	177,714	179,425	+ 1.0	194,000	+ 8.1
(Daily Average)	487	492	+ 1.0	530	+ 7.7
Refined Products Imports	131,435	127,807	— 2.8	140,000	+ 9.5
(Daily Average)	360	350	— 2.8	382	+ 9.1
Stocks End of Year, All Oils	**582,710**	**616,064**	**+ 5.7**	**616,064**	.....
Crude Stocks	248,463	256,227	+ 3.1	256,227	.....
Natural Gasoline Stocks	7,355	8,400	+ 14.2	8,400	.....
Refined Products Stocks	326,892	351,437	+ 7.5	351,437	.....
Motor Fuel Stocks	116,024	124,152	+ 7.0	124,152	.....
Kerosine Stocks	19,723	25,140	+ 27.5	25,140	.....
Residual Fuel Oil Stocks	40,750	42,448	+ 4.2	42,448	.....
Distillate Fuel Oil Stocks	71,948	82,533	+ 14.7	82,533	.....
Lubricant Stocks	7,849	9 400	+ 19.8	9,400	.....

indicating that 10,392 producing oil wells were abandoned or shut in during 1951.

Drilling rigs in operation in 1951 averaged 4844, an increase of 7.2 percent over the 4517 average for 1950. This gain was required by the 9.1 percent increase in 1951 in amount of footage drilled. Another gain in average number of rigs operated is indicated for 1952, as footage drilled is expected to increase 6 percent.

Contractors Drill More

The proportion of wells completed on a contract basis further increased in 1951 to 90 percent of the U. S. total from 89 percent in 1950 and from 70 percent ten years ago. Similarly, contractors now own 85 percent of the nation's drilling rigs or 4600 out of a total of 5400. Of this total, 5182 were operating at the end of 1951, with the remainder moving between jobs or idle.

Since the number of wells drilled by cable tools has remained constant at about 8000 per year, virtually all of the sharp postwar expansion in drilling has represented increased well completions by rotary rigs. The 36,757 wells credited to rotary rigs in 1951 were more than double the 17,908 in 1945 and brought rotaries' proportion of completions up to 82 percent from 67 percent in 1945.

Salient Annual Statistics of the United States

ITEM	NUMBER, EXCEPT AS NOTED				
	1950	1951	Percent Change '50-'51	1952 Forecast	Percent Change '51-'52
Natural Gasoline Production, Thous. Bbls.	**181,559**	**205,501**	**+ 13.2**	**217,000**	**+ 5.6**
(Daily Average)	497	563	+ 13.2	593	+ 5.3
Nat'l Gas, Marketed Production (Biln. Cu. Ft.)	**6,282**	**7,252**	**+ 15.4**	**8,000**	**+10.3**
Value at Consumption Points, ¢ per M. Cu. Ft.	26.5	27.0	+ 1.9	27.0	.....
Value at Wells, ¢ per M. Cu. Ft.	6.5	6.6	+ 1.5	6.6	.....
Pipe Line Construction, Miles	**16,120**	**12,628**	**— 21.7**	.....	.....
Crude Lines Completed, Miles	2,843	1,929	— 32.2	.....	.....
Gas Lines Completed, Miles	10,854	8,946	— 17.6	.....	.....
Product Lines Completed, Miles	2,423	1,753	— 27.6	.....	.....
Crude Reserves, Year-End, Miln. Bbls.	**25,268**	**26,309**	**+ 4.1**	**27,270**	**+ 3.7**
New Crude Reserves Proved, Miln. Bbls.	**2,563**	**3,254**	**+ 27.0**	**3,250**	**— 0.1**
New Fields and Pays Found	**1,376**	**1,654**	**+ 20.2**	.....	.....
New Oil Discoveries	**1,119**	**1,341**	**+ 19.8**	.....	.....
New Fields	811	1,001	+ 23.4	.....	.....
New Pays	308	340	+ 10.4	.....	.....
New Gas Discoveries	**172**	**226**	**+ 31.4**	.....	.....
New Fields	137	177	+ 29.2	.....	.....
New Pays	35	49	+ 40.0	.....	.....
New Distillate Discoveries	**85**	**87**	**+ 2.4**	.....	.....
New Fields	67	60	— 10.5	.....	.....
New Pays	18	27	+ 50.0	.....	.....
Strict Wildcats Drilled	**7,891**	**9,705**	**+ 23.0**	**10,684**	**+ 10.1**
Productive	1,015	1,238	+ 22.0	.....	.....
Non-Productive	6,876	8,467	+ 23.1	.....	.....
Well Completions, Total	**44,058**	**45,584**	**+ 3.5**	.....	.....
New Wells, Total	43,307	44,826	+ 3.5	45,967	+ 2.5
Oil Wells	23,775	23,179	— 2.5	.....	.....
Gas Wells	3,015	3,094	+ 2.6	.....	.....
Distillate Wells	465	344	— 26.0	.....	.....
Dry Holes	14,918	17,026	+ 14.1	.....	.....
Gas Injection Wells	38	79	+107.9	.....	.....
Water Input Wells	993	1,037	+ 4.4	.....	.....
Water Disposal Wells	103	67	+ 35.0	.....	.....
Old Wells Drilled Deeper	751	758	+ 0.9	.....	.....
Footage Drilled, Thousand Feet	**160,369**	**174,914**	**+ 9.1**	.....	.....
Footage Drilled, New Wells, Thousand Feet	159,762	174,262	+ 9.1	184,688	+ 6.0
Wells Drilling, End of Year	**4,665**	**5,182**	**+ 11.1**	.....	.....
Producing Oil Wells, End of Year	**466,308**	**479,095**	**+ 2.7**	.....	.....
Flowing Oil Wells	54,052	55,548	+ 2.8	.....	.....
Pumping Oil Wells	412,256	423,547	+ 2.7	.....	.....

Petroleum Demand

Requires Greater Supply

By L. J. LOGAN, WORLD OIL Staff

FURTHER increase in domestic crude production will be required in 1952 despite the sharp increase in 1951. U. S. producers will have a market for 6,336,000 barrels of crude per day in 1952. This is the U. S. Bureau of Mines computation, based on its annual forecast of demand for petroleum and products.

This indicated volume of crude production to be needed would be 216,000 barrels per day or 3.5 percent more than the market demand in 1951. It would be, however, only 187,000 barrels a day or 3.0 percent more than actual crude production of 1951, which exceeded demand enough to result in stocks of domestic crude increasing about 29,000 barrels daily average for the year.

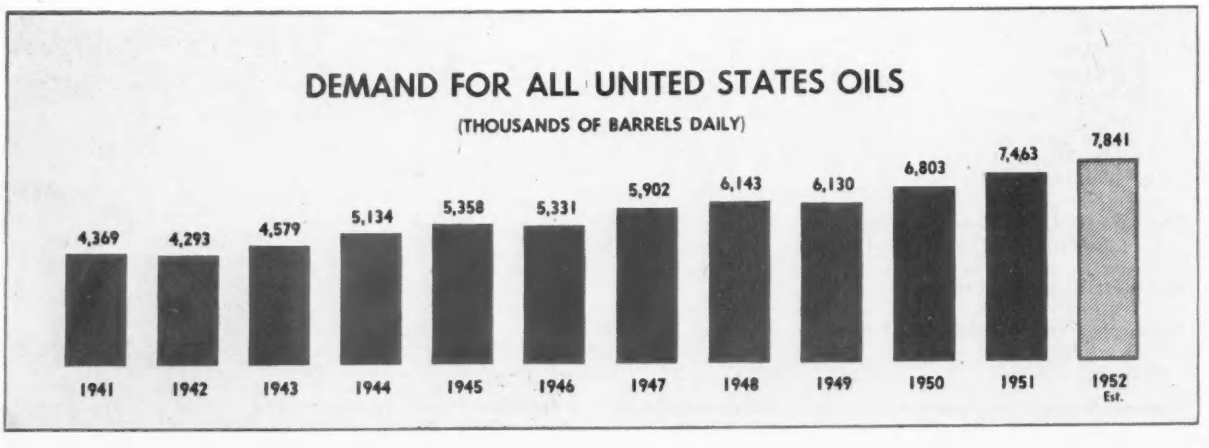
The increase in requirements for domestic crude production will be somewhat less than the gain in demand for oils, which will amount to 5.1 percent on a daily average basis. Need for crude will be up less than that for several reasons. In the first place, no net increase in stocks of crude or products is projected for 1952, whereas 1951 production included 91,000 barrels a day that went into crude and refined product storage. In the second place, demand will be met in an increased proportion by natural gasoline, with production of that oil up 5.1 percent in comparison with the smaller gain for crude. Natural gasoline output of 593,000 barrels daily, as forecast, would be 29,000 barrels a day greater than in 1951. Finally, a relatively larger part of de-

Demand for All Oils

(All Figures in Barrels)

YEAR	TOTAL (Domestic and Export) Annual Total	TOTAL (Domestic and Export) Daily Average	DOMESTIC Annual Total	DOMESTIC Daily Average	EXPORTS Annual Total	EXPORTS Daily Average
1918	.....	.....	.....	.....	.....	.....
1919	438,434,000	1,201,200	374,541,000	1,026,100	63,893,000	175,100
1920	535,382,000	1,462,800	456,764,000	1,245,300	79,618,000	217,500
1921	592,402,000	1,450,400	457,521,000	1,253,300	71,881,000	196,900
1922	605,540,000	1,659,000	530,990,000	1,454,800	74,550,000	204,200
1923	754,361,000	2,066,700	652,027,000	1,786,400	102,334,000	280,300
1924	805,070,000	2,199,600	687,742,000	1,879,100	117,328,000	320,500
1925	840,818,000	2,303,600	726,797,000	1,991,200	114,021,000	312,400
1926	912,893,000	2,501,100	780,487,000	2,138,300	132,406,000	362,800
1926	944,762,000	2,588,400	802,499,000	2,198,600	142,263,000	389,800
1928	1,014,716,000	2,772,400	859,759,000	2,349,000	154,957,000	423,400
1929	1,103,203,000	3,022,500	940,083,000	2,575,600	163,120,000	446,900
1930	1,083,511,000	2,968,500	927,016,000	2,539,800	156,495,000	428,700
1931	1,027,274,000	2,814,500	902,920,000	2,473,800	124,354,000	340,700
1932	938,757,000	2,564,900	835,482,000	2,282,700	103,275,000	282,200
1933	975,214,000	2,671,800	868,487,000	2,379,400	106,727,000	292,400
1934	1,034,672,000	2,834,700	920,165,000	2,521,000	114,507,000	313,700
1935	1,112,672,000	3,048,400	983,685,000	2,695,000	128,987,000	353,400
1936	1,224,748,000	3,346,300	1,092,754,000	2,985,700	131,994,000	360,600
1937	1,342,516,000	3,678,100	1,169,682,000	3,204,600	172,834,000	473,500
1938	1,330,850,000	3,646,200	1,137,122,000	3,115,400	193,728,000	530,800
1939	1,420,035,000	3,890,500	1,231,067,000	3,372,800	188,959,000	517,700
1940	1,457,086,000	3,981,100	1,326,620,000	3,624,600	130,466,000	356,500
1941	1,594,609,000	4,368,800	1,485,779,000	4,070,600	108,830,000	298,200
1942	1,566,815,000	4,292,600	1,449,908,000	3,972,300	116,907,000	320,300
1943	1,671,383,000	4,579,100	1,521,426,000	4,168,300	149,957,000	410,800
1944	1,878,879,000	5,133,600	1,671,263,000	4,566,300	207,616,000	567,300
1945	1,955,668,000	5,358,000	1,772,685,000	4,856,700	182,983,000	501,300
1946	1,945,909,000	5,331,200	1,792,786,000	4,911,700	153,123,000	419,500
1947	2,154,280,000	5,902,100	1,989,803,000	5,451,500	164,477,000	450,600
1948	2,248,352,000	6,143,000	2,113,678,000	5,775,100	134,674,000	368,000
1949	2,237,626,000	6,130,500	2,118,250,000	5,803,400	119,376,000	327,100
1950	2,483,119,000	6,803,100	2,372,084,000	6,498,900	111,035,000	304,200
1951	2,724,018,000	7,463,000	2,568,080,000	7,035,800	155,938,000	427,200
*1952	2,870,000,000	7,841,500	2,757,000,000	7,532,800	113,000,000	308,700

Source: U. S. Bureau of Mines, except November and December, 1951, estimated with aid of A.P.I. Reports. * Forecast.



U. S. Petroleum Supply and Demand

Thousands of Barrels Daily

YEAR	SUPPLY			Change in Stocks	DEMAND		
	U.S. Prod. All Oils[1]	Total Imports[2]	Total New Supply	All Oils[3]	Domestic Demand[4]	Exports and Shipments[5]	Total Demand
1936	3,128	156	3,284	—62	2,986	360	3,346
1937	3,647	157	3,804	+126	3,205	473	3,678
1938	3,472	149	3,621	—25	3,115	531	3,646
1939	3,614	162	3,776	—115	3,373	518	3,891
1940	3,858	229	4,087	+106	3,625	356	3,981
1941	4,073	266	4,339	—30	4,071	298	4,369
1942	4,034	99	4,133	—160	3,972	321	4,293
1943	4,372	174	4,546	—33	4,168	411	4,579
1944	4,864	252	5,116	—17	4,562	571	5,133
1945	5,010	311	5,321	—37	4,857	501	5,358
1946	5,073	377	5,450	+119	4,912	419	5,331
1947	5,451	437	5,888	—14	5,451	451	5,902
1948	5,921	514	6,435	+292	5,775	368	6,143
1949	5,477	645	6,122	—8	5,803	327	6,130
1950	5,900	847	6,747	—56	6,499	304	6,803
1951	6,713	842	7,554	+91	7,036	427	7,463
1952 Estimate	6,929	912	7,841	.....	7,533	308	7,841

[1] Includes crude oil, natural gasoline, related products, and benzol. [2] Includes both refined and crude oils. [3] Includes changes in both refined and crude oil stocks. Minus signs indicate decreases and plus signs increases. [4] Includes military and civilian demand in continental United States and shipments to U. S. armed forces abroad. [5] Includes shipments to non-contiguous territories.

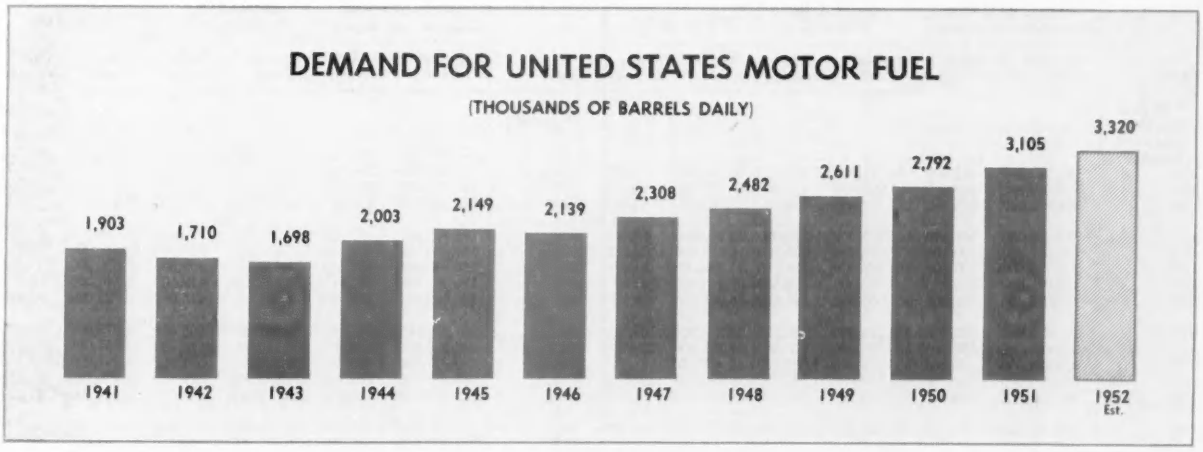
Source: Data from U. S. Bureau of Mines, except November and December, 1951, estimated by WORLD OIL.

mand will be supplied by imports in 1952, following a slight decline in imports in 1951. For 1952, it is predicted that total imports will average 912,000 barrels daily, an increase of 70,000 a day or 8.3 percent over the 842,000 daily of 1951. They had averaged 847,000 daily in 1950. Daily average imports of crude will be up 7.7 percent in 1952, it is forecast, and imports of refined products will be up 9.1 percent.

Runs to Stills

Crude runs to stills to be required in 1952 will average 6,760,000 barrels daily, an increase of 264,000 daily or 4.1 percent over the runs of 6,496,000 daily in 1951. This increase will be somewhat smaller than the 5.1 percent gain in total demand for all oils because of not repeating the 1951 expansion of refined product stocks, relatively more gasoline production, and increased imports of refined products.

This outlook for U. S. crude production requirements is based on U. S. Bureau of Mines estimates of domestic and export demand for motor fuel,



Demand for Motor Fuel

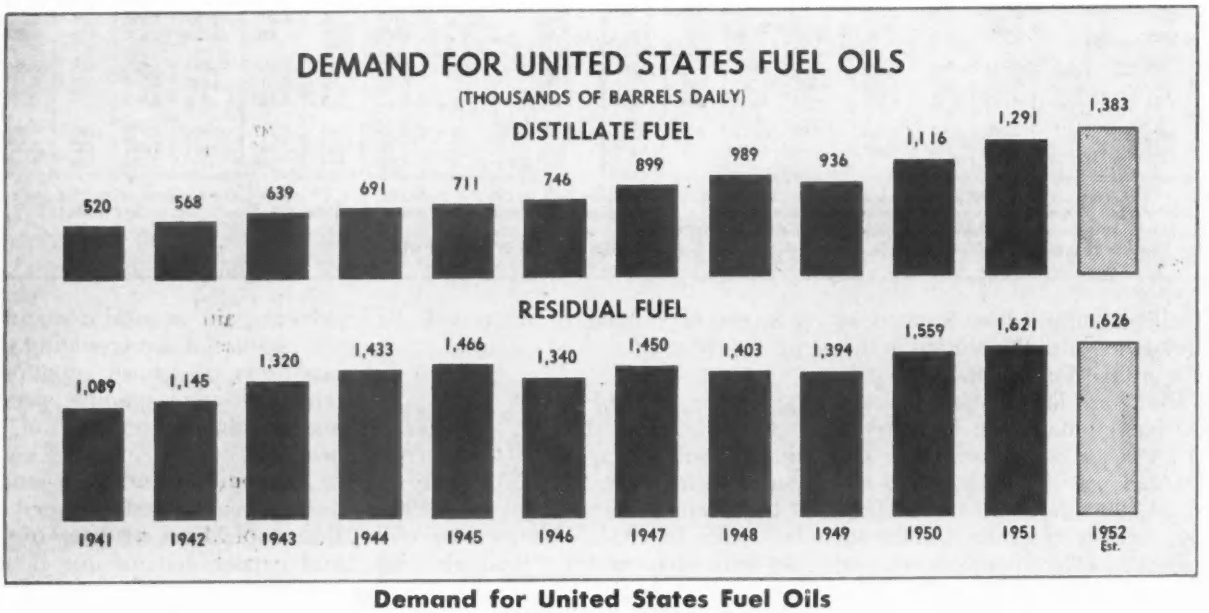
(All Figures in Barrels)

YEAR	TOTAL (Domestic and Export)		DOMESTIC		EXPORTS	
	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average
1918	93,599,000	256,400	79,949,000	219,000	13,650,000	37,000
1919	97,790,000	267,900	88,648,000	242,900	9,142,000	25,000
1920	124,623,000	340,500	108,945,000	297,700	15,678,000	42,800
1921	130,203,000	356,700	116,840,000	320,100	13,363,000	36,600
1922	152,132,000	416,800	137,770,000	377,500	14,362,000	39,300
1923	195,556,000	535,800	174,462,000	478,000	21,094,000	57,800
1924	225,737,000	616,800	196,586,000	537,100	29,151,000	79,700
1925	264,429,000	724,500	232,745,000	637,700	31,684,000	86,800
1926	311,897,000	854,500	268,128,000	734,600	43,769,000	119,900
1926	350,318,000	959,800	305,367,000	836,600	44,951,000	123,200
1928	392,293,000	1,071,800	338,881,000	925,900	53,412,000	145,900
1929	444,937,000	1,219,000	382,878,000	1,049,000	62,059,000	170,000
1930	463,184,000	1,269,000	397,609,000	1,089,300	65,575,000	179,700
1931	453,559,000	1,242,600	407,843,000	1,117,400	45,716,000	125,200
1932	413,229,000	1,129,000	377,791,000	1,032,200	35,438,000	96,800
1933	409,815,000	1,122,800	380,494,000	1,042,500	29,321,000	80,300
1934	435,025,000	1,191,800	410,339,000	1,124,200	24,686,000	67,600
1935	465,423,000	1,275,100	434,810,000	1,191,200	30,613,000	83,900
1936	510,252,000	1,394,100	481,606,000	1,315,800	28,646,000	78,300
1937	557,658,000	1,527,800	519,352,000	1,422,900	38,306,000	104,900
1938	573,112,000	1,570,200	523,003,000	1,432,900	50,109,000	137,300
1939	600,147,000	1,644,200	555,509,000	1,521,900	44,638,000	122,300
1940	614,867,000	1,679,900	589,490,000	1,610,600	25,377,000	69,300
1941	694,588,000	1,903,000	667,505,000	1,828,800	27,083,000	74,200
1942	624,207,000	1,710,200	589,110,000	1,614,000	35,097,000	96,200
1943	619,815,000	1,698,100	568,238,000	1,556,800	51,577,000	141,300
1944	733,019,000	2,002,800	632,482,000	1,728,100	100,537,000	274,700
1945	784,392,000	2,149,000	696,333,000	1,907,800	88,059,000	241,200
1946	780,751,000	2,139,000	735,417,000	2,014,800	45,334,000	124,200
1947	842,464,000	2,308,100	795,015,000	2,178,100	47,449,000	130,000
1948	908,572,000	2,482,400	871,270,000	2,380,500	37,302,000	101,900
1949	953,060,000	2,611,100	913,713,000	2,503,300	39,347,000	107,800
1950	1,018,997,000	2,791,800	994,412,000	2,724,400	24,585,000	67,400
1951	1,133,208,000	3,104,700	1,093,267,000	2,995,300	39,941,000	109,400
*1952	1,215,000,000	3,319,700	1,187,000,000	3,243,200	28,000,000	76,500

Source: U. S. Bureau of Mines, except November and December, 1951, estimated with aid of A.P.I. reports. * Forecast.

distillate fuel oil, residual fuel oil, and other petroleum products. Those estimates take into account the various factors that influence demand for the different products, such as the increases in number of motor vehicles in use and the trends in oil burner installations.

Total demand for all oils will average 7,841,000 barrels daily in 1952, an increase of 378,000 barrels daily or 5.1 percent over the 7,463,000 daily of 1951, the bureau forecasts. This would be an increase that might be described as about normal, whereas 1951's total demand was 660,000 barrels a day or 9.7 percent above the 6,803,000 daily of 1950.



Demand for United States Fuel Oils

(All Figures in Barrels)

YEAR	TOTAL DEMAND (Domestic and Export) Annual Total	TOTAL DEMAND (Domestic and Export) Daily Average	DOMESTIC DEMAND Annual Total	DOMESTIC DEMAND Daily Average	EXPORTS Annual Total	EXPORTS Daily Average
* All Fuel Oils (Distillate and Residual)						
1918	172,387,000	472,300	142,751,000	391,100	29,636,000	81,200
1919	180,290,000	494,000	163,803,000	448,800	16,487,000	45,200
1920	208,052,000	568,400	185,972,000	508,100	22,080,000	60,300
1921	218,332,000	598,100	195,656,000	536,000	22,676,000	62,100
1922	255,542,000	700,100	237,063,000	649,500	18,479,000	50,600
1923	294,760,000	807,500	261,388,000	716,100	33,372,000	91,400
1924	328,015,000	896,200	290,766,000	794,400	37,249,000	101,800
1925	343,092,000	940,000	307,004,000	841,100	36,088,000	98,900
1926	377,923,000	1,035,400	339,572,000	930,300	38,351,000	105,100
1927	386,656,000	1,059,300	339,265,000	929,500	47,391,000	129,800
1928	428,401,000	1,170,500	383,974,000	1,049,100	44,427,000	121,400
1929	454,307,000	1,244,700	415,156,000	1,137,400	39,151,000	107,300
1930	404,981,000	1,109,600	368,531,000	1,009,700	36,450,000	99,900
1931	363,899,000	997,000	334,668,000	916,900	29,231,000	80,100
1932	324,151,000	885,600	304,157,000	831,000	19,994,000	54,600
1933	344,268,000	943,200	323,705,000	886,900	20,563,000	56,300
1934	368,976,000	1,010,900	340,371,000	932,500	28,605,000	78,400
1935	395,671,000	1,084,000	366,723,000	1,004,700	28,948,000	79,300
1936	445,524,000	1,217,300	410,641,000	1,122,000	34,883,000	95,300
1937	487,788,000	1,336,400	442,355,000	1,211,900	45,433,000	124,500
1938	456,843,000	1,251,600	409,282,000	1,121,300	47,561,000	130,300
1939	507,966,000	1,391,700	458,461,000	1,256,100	49,505,000	135,600
1940	536,263,000	1,465,200	501,014,000	1,368,900	35,249,000	96,300
1941	587,285,000	1,609,000	556,246,000	1,524,000	31,039,000	85,000
1942	625,028,000	1,712,400	591,358,000	1,620,200	33,670,000	92,200
1943	714,969,000	1,958,800	675,118,000	1,849,600	39,851,000	109,200
1944	777,367,000	2,124,000	721,340,000	1,970,900	56,027,000	153,100
1945	794,672,000	2,177,200	749,507,000	2,053,500	45,165,000	123,700
1946	761,598,000	2,086,600	722,923,000	1,980,600	38,675,000	106,000
1947	857,283,000	2,348,700	816,783,000	2,237,800	40,500,000	110,900
1948	875,423,000	2,391,900	841,119,000	2,298,100	34,304,000	93,700
1949	850,235,000	2,329,400	825,299,000	2,261,100	24,936,000	68,300
1950	976,447,000	2,675,200	947,641,000	2,596,200	28,806,000	79,000
1951	1,063,107,000	2,912,400	1,009,963,000	2,767,000	53,054,000	145,400
1952 Est.	1,101,000,000	3,008,200	1,063,000,000	2,904,400	38,000,000	103,800

YEAR	TOTAL DEMAND (Domestic and Export) Annual Total	TOTAL DEMAND (Domestic and Export) Daily Average	DOMESTIC DEMAND Annual Total	DOMESTIC DEMAND Daily Average	EXPORTS Annual Total	EXPORTS Daily Average
Distillate Fuel Oil						
1932	73,883,000	201,900	65,101,000	177,900	8,782,000	24,000
1933	76,172,000	208,700	64,748,000	177,400	11,424,000	31,300
1934	89,330,000	244,700	74,824,000	205,000	14,506,000	39,700
1935	102,277,000	280,200	86,028,000	235,700	16,249,000	44,500
1936	123,205,000	336,600	102,757,000	280,800	20,448,000	55,800
1937	146,970,000	402,600	116,841,000	320,100	30,129,000	82,500
1938	147,090,000	403,000	117,449,000	321,800	29,641,000	81,200
1939	166,993,000	457,500	134,973,000	369,800	32,020,000	87,700
1940	179,991,000	491,800	160,851,000	439,500	19,140,000	52,300
1941	189,749,000	519,900	172,824,000	473,500	16,925,000	46,400
1942	207,236,000	567,700	185,661,000	508,600	21,575,000	59,100
1943	233,067,000	638,600	208,110,000	570,200	24,957,000	68,400
1944	252,811,000	690,700	209,320,000	571,900	43,491,000	118,800
1945	259,580,000	711,100	226,084,000	619,400	33,496,000	91,700
1946	272,381,000	746,300	242,894,000	665,500	29,487,000	80,800
1947	328,150,000	899,000	298,273,000	817,200	29,877,000	81,800
1948	361,869,000	988,700	340,576,000	930,500	21,293,000	58,200
1949	341,573,000	935,800	329,278,000	902,100	12,295,000	33,700
1950	407,276,000	1,115,800	394,697,000	1,081,300	12,579,000	34,500
1951	471,249,000	1,291,100	448,242,000	1,228,100	23,007,000	63,000
1952 Est.	506,000,000	1,382,500	488,000,000	1,333,300	18,000,000	49,200
Residual Fuel Oil						
1932	250,268,000	683,800	239,056,000	653,200	11,212,000	30,600
1933	268,096,000	734,500	258,957,000	709,500	9,139,000	25,000
1934	279,646,000	766,100	265,547,000	727,500	14,099,000	38,600
1935	293,394,000	803,800	280,695,000	769,000	12,699,000	34,800
1936	322,319,000	880,700	307,884,000	841,200	14,435,000	39,500
1937	340,818,000	933,700	325,514,000	891,800	15,304,000	41,900
1938	309,753,000	848,600	291,833,000	799,500	17,920,000	49,100
1939	340,973,000	934,200	323,488,000	886,300	17,485,000	47,900
1940	356,272,000	973,400	340,163,000	929,400	16,109,000	44,000
1941	397,536,000	1,089,100	383,422,000	1,050,400	14,114,000	38,700
1942	417,792,000	1,144,600	405,697,000	1,111,500	12,095,000	33,100
1943	481,902,000	1,320,300	467,008,000	1,279,500	14,894,000	40,800
1944	524,556,000	1,433,200	512,020,000	1,399,000	12,536,000	34,200
1945	535,092,000	1,466,000	523,423,000	1,434,000	11,669,000	32,000
1946	489,217,000	1,340,300	480,029,000	1,315,100	9,188,000	25,200
1947	529,133,000	1,449,700	518,510,000	1,420,600	10,623,000	29,100
1948	513,554,000	1,403,200	500,543,000	1,367,600	13,011,000	35,500
1949	508,662,000	1,393,600	496,021,000	1,359,000	12,641,000	34,600
1950	569,171,000	1,559,400	552,944,000	1,514,900	16,227,000	44,500
1951	591,768,000	1,621,300	561,721,000	1,539,000	30,047,000	82,300
1952 Est.	595,000,000	1,625,700	575,000,000	1,571,000	20,000,000	54,600

* Breakdown of fuel oils by distillates and residual grades not available prior to 1932; but breakdown for 1932 and subsequent years appears at right.

Source: U. S. Bureau of Mines, except November and December, 1951, estimated with aid of A.P.I. reports.

Growth of total demand will be smaller in 1952 than in 1951 because exports will be down sharply, whereas they were up precipitously in 1951, due to shutdown of Iran's oil industry. Total U. S. exports in 1952 are forecast at 308,000 barrels daily, a decrease of 27.9 percent from the 427,000 daily of 1951. The latter volume represented an increase of 40.4 percent over the exports of 304,000 barrels per day in 1950. Crude exports declined even in 1951 by 17.8 percent to 78,000 barrels daily from 95,000 in 1950, and they will further decrease in 1952 by 37.2 percent to 49,000 daily. Exports of refined products jumped 67 percent in 1951 to 349,000 barrels daily from 209,000 in 1950, but are expected to decline 25.8 percent in 1952 to 259,000 daily. The decreases in daily average exports of refined products in 1952 will include declines of 30 percent for motor fuel, 38.1 percent for kerosine, 22.2 percent for distillate fuel oil, and 32.9 percent for residual fuel oil.

Domestic demand for all oils will show continued growth at about the same rate as heretofore. After rising 537,000 barrels daily or 8.3 percent from 6,499,000 daily in 1950 to 7,036,000 in 1951, it is expected to increase 497,000 barrels or 7.1 percent to 7,533,000 daily in 1952.

With exports down, motor fuel

Forecast of Petroleum Demand and Supply in 1952, Compared With 1951 and 1950

All data from U. S. Bureau of Mines except November and December, 1951, estimated with aid of A.P.I. statistical bulletins.

(THOUSANDS OF BARRELS)

ITEM	ANNUAL COMPARISONS 1950	1951	% Diff. '50-'51	1952 Forecast	% Diff. '51-'52	1952 FORECAST BY QUARTERS 1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
DEMAND									
All Oils, Total Demand	**2,483,119**	**2,724,018**	**+ 9.7**	**2,870,000**	**+ 5.4**	**745,000**	**679,000**	**688,000**	**758,000**
(Daily Average)	6,803	7,463	+ 9.7	**7,841**	+ 5.1	8,187	7,462	7,478	8,239
Domestic Demand	2,372,084	2,568,080	+ 8.3	**2,757,000**	+ 7.4	708,000	646,000	665,000	738,000
(Daily Average)	6,499	7,036	+ 8.3	**7,533**	+ 7.1	7,780	7,099	7,228	8,022
Exports, Total	111,035	155,938	+ 40.4	**113,000**	— 27.5	37,000	33,000	23,000	20,000
(Daily Average)	304	427	+ 40.4	**308**	— 27.9	407	363	250	217
Crude Exports	34,798	28,599	— 17.8	**18,000**	— 37.1	5,000	5,000	4,000	4,000
(Daily Average)	95	78	— 17.8	**49**	— 37.2	55	55	43	43
Refined Exports	76,237	127,339	+ 67.0	**95,000**	— 25.4	32,000	28,000	19,000	16,000
(Daily Average)	209	349	+ 67.0	**259**	— 25.8	352	308	207	174
Motor Fuel, Total Demand	**1,018,997**	**1,133,208**	**+ 11.2**	**1,215,000**	**+ 7.2**	**266,000**	**317,000**	**328,000**	**304,000**
(Daily Average)	2,792	3,105	+ 11.2	**3,320**	+ 6.9	2,923	3,484	3,565	3,304
Domestic Demand	994,412	1,093,267	+ 9.9	**1,187,000**	+ 8.6	257,000	309,000	322,000	299,000
(Daily Average)	2,725	2,995	+ 9.9	**3,243**	+ 8.3	2,824	3,396	3,500	3,250
Exports	24,585	39,941	+ 62.5	**28,000**	— 29.9	9,000	8,000	6,000	5,000
(Daily Average)	67	110	+ 62.5	**77**	— 30.0	99	88	65	54
Kerosine, Total Demand	**119,922**	**129,639**	**+ 8.1**	**137,000**	**+ 5.7**	**47,000**	**23,000**	**23,000**	**44,000**
(Daily Average)	329	355	+ 8.1	**374**	+ 5.4	517	253	250	478
Domestic Demand	117,846	122,025	+ 3.5	**132,000**	+ 8.2	44,500	21,500	22,500	43,500
(Daily Average)	323	334	+ 3.5	**361**	+ 8.1	489	236	244	473
Exports	2,076	7,614	+266.8	**5,000**	— 34.3	2,500	1,500	500	500
(Daily Average)	6	21	+266.8	**13**	— 38.1	28	17	6	5
Distillate Fuel Oil, Total Demand	**407,276**	**471,249**	**+ 15.7**	**506,000**	**+ 7.4**	**171,000**	**96,000**	**91,000**	**148,000**
(Daily Average)	1,116	1,291	+ 15.7	**1,382**	+ 7.0	1,879	1,055	989	1,609
Domestic Demand	394,697	448,242	+ 13.6	**488,000**	+ 8.9	164,000	90,000	88,000	146,000
(Daily Average)	1,081	1,228	+ 13.6	**1,333**	+ 8.5	1,802	989	957	1,587
Exports	12,579	23,007	+ 82.9	**18,000**	— 21.8	7,000	6,000	3,000	2,000
(Daily Average)	35	63	+ 82.9	**49**	— 22.2	77	66	32	22
Residual Fuel Oil, Total Demand	**569,171**	**591,768**	**+ 4.0**	**595,000**	**+ 0.5**	**165,000**	**137,000**	**134,000**	**159,000**
(Daily Average)	1,559	1,621	+ 4.0	**1,626**	+ 0.3	1,813	1,505	1,457	1,728
Domestic Demand	552,944	561,721	+ 1.6	**575,000**	+ 2.4	158,000	131,000	130,000	156,000
(Daily Average)	1,515	1,539	+ 1.6	**1,571**	+ 2.1	1,736	1,440	1,413	1,696
Exports	16,227	30,437	+ 85.2	**20,000**	— 33.4	7,000	6,000	4,000	3,000
(Daily Average)	44	82	+ 85.2	**55**	— 32.9	77	65	44	32
***All Other Oils, Total Demand**	**367,753**	**398,154**	**+ 8.3**	**417,000**	**+ 4.7**	**96,000**	**106,000**	**112,000**	**103,000**
(Daily Average)	1,007	1,091	+ 8.3	**1,139**	+ 4.4	1,055	1,165	1,217	1,120
Domestic Demand	312,185	342,825	+ 9.8	**375,000**	+ 9.4	84,500	94,500	102,500	93,500
(Daily Average)	855	939	+ 9.8	**1,025**	+ 9.2	929	1,038	1,114	1,016
Exports	55,568	55,329	— 0.4	**42,000**	— 24.1	11,500	11,500	9,500	9,500
(Daily Average)	152	152	— 0.4	**114**	— 25.0	126	127	103	104
CHANGE IN STOCKS									
All Oils	**—20,409**	**+33,354**	.....	.....	.....	**—40,000**	**+28,000**	**+36,000**	**—24,000**
(Daily Average)	—56	+91	.....	.....	.....	—439	+307	+392	—260
Crude Oil	—4,893	+7,764	.....	.....	.....	.....	.....	.....	.....
(Daily Average)	—13	+21	.....	.....	.....	.....	.....	.....	.....
Natural Gasoline	+524	+1,045	.....	.....	.....	.....	.....	.....	.....
(Daily Average)	+1	+3	.....	.....	.....	.....	.....	.....	.....
Refined Products	—16,040	+24,545	.....	.....	.....	—40,000	+28,000	+36,000	—24,000
(Daily Average)	—44	+67	.....	.....	.....	—439	+307	+392	—260
NEW SUPPLY									
Total New Supply	**2,462,710**	**2,757,372**	**+ 12.0**	**2,870,000**	**+ 4.1**	**705,000**	**707,000**	**724,000**	**734,000**
(Daily Average)	6,747	7,554	+ 12.0	**7,841**	+ 3.8	7,748	7,769	7,870	7,979
Domestic Production, Total	**2,153,561**	**2,450,140**	**+ 13.8**	**2,536,000**	**+ 3.5**	**626,000**	**628,000**	**640,000**	**642,000**
(Daily Average)	5,900	6,713	+ 13.8	**6,929**	+ 3.2	6,880	6,901	6,957	6,979
Crude Oil	1,971,845	2,244,404	+ 13.8	**2,319,000**	+ 3.3	572,000	575,000	586,000	586,000
(Daily Average)	5,402	6,149	+ 13.8	**6,336**	+ 3.0	6,286	6,319	6,370	6,370
Other Oils	181,716	205,736	+ 13.2	**217,000**	+ 5.5	54,000	53,000	54,000	56,000
(Daily Average)	498	564	+ 13.2	**593**	+ 5.1	594	582	587	609
Imports, Total	**309,149**	**307,232**	**— 0.6**	**334,000**	**+ 8.7**	**79,000**	**79,000**	**84,000**	**92,000**
(Daily Average)	847	842	— 0.6	**912**	+ 8.3	868	868	913	1,000
Crude Oil	177,714	179,425	+ 1.0	**194,000**	+ 8.1	45,000	47,000	50,000	52,000
(Daily Average)	487	492	+ 1.0	**530**	+ 7.7	494	516	543	565
Refined Products	131,435	127,807	— 2.8	**140,000**	+ 9.5	34,000	32,000	34,000	40,000
(Daily Average)	360	350	— 2.8	**382**	+ 9.1	374	352	370	435
Crude Oil Runs to Stills, Total	**2,094,867**	**2,371,168**	**+ 13.2**	**2,474,160**	**+ 4.3**	**607,880**	**612,430**	**625,600**	**628,360**
(Daily Average)	5,739	6,496	+ 13.2	**6,760**	+ 4.1	6,680	6,730	6,800	6,830
Demand for Domestic Crude, Total	**1,978,035**	**2,233,751**	**+ 12.9**	**2,318,976**	**+ 3.8**	**572,026**	**575,029**	**586,040**	**586,040**
(Daily Average)	5,419	6,120	+ 12.9	**6,336**	+ 3.5	6,286	6,319	6,370	6,370

* Includes crude oil used as fuel and lost in handling, liquefied gases, petroleum coke, asphalt, road oil, etc., and refinery losses.

Demand for and Supply of All Oils, Crude Oil, Motor Fuel, Kerosine, Fuel Oil and Lubricants

Sources: U. S. Bureau of Mines except November and December, 1951, estimated with aid of A.P.I. reports.

(THOUSANDS OF BARRELS)

ITEM	Year 1950	Year 1951	% Diff. '50-'51
ALL OILS			
Domestic Production, Total	2,153,561	2,450,140	+ 13.8
(Daily Average)	5,900	6,713	+ 13.8
Crude Petroleum	1,971,845	2,244,404	+ 13.8
(Daily Average)	5,402	6,149	+ 13.8
Natural Gasoline	181,558	205,501	+ 13.2
(Daily Average)	497	563	+ 13.2
Benzol	158	235	+ 48.7
(Daily Average)	1	1	+ 48.7
Imports, Total	309,149	307,232	— 0.6
(Daily Average)	847	842	— 0.6
Crude Petroleum	177,714	179,425	+ 1.0
(Daily Average)	487	492	+ 1.0
Refined Products	131,435	127,807	— 2.8
(Daily Average)	360	350	— 2.8
Changes in Stocks, All Oils	—20,409	+ 33,354	.....
(Daily Average)	—56	+91	.....
Stocks, Beginning of Period	602,891	582,710	— 3.3
Crude Oil	253,356	248,463	— 1.9
Refined Products	342,704	326,892	— 4.6
Natural Gasoline	6,831	7,355	+ 7.7
Stocks, End of Period	582,710	616,064	+ 5.7
(Days' Supply)	86	83	— 3.5
Crude Oil	248,463	256,227	+ 3.1
Refined Products	326,892	351,473	+ 7.5
Natural Gasoline	7,355	8,400	+ 14.2
Demand, Total	2,483,119	2,724,018	+ 9.7
(Daily Average)	6,803	7,463	+ 9.7
Exports, Total	111,035	155,938	+ 40.4
(Daily Average)	304	427	+ 40.4
Crude Petroleum, Total	34,798	28,599	— 17.8
(Daily Average)	95	78	— 17.8
Refined Products, Total	76,237	127,339	+ 67.0
(Daily Average)	209	349	+ 67.0
Domestic Demand, Total	2,372,084	2,568,080	+ 8.3
(Daily Average)	6,499	7,036	+ 8.3
CRUDE PETROLEUM			
Supply:			
Domestic Production, Total	1,971,845	2,244,404	+ 13.8
(Daily Average)	5,402	6,149	+ 13.8
Imports, Total	177,714	179,425	+ 1.0
(Daily Average)	487	492	+ 1.0
Change in Stocks	—4,893	+7,764	.....
(Daily Average)	—14	+21	.....
Stocks, Beginning of Period	253,356	248,463	— 1.9
Stocks, End of Period	248,463	256,227	+ 3.1
(Days' Supply)	42	39	— 7.2
Supply, Total	2,154,452	2,416,065	+ 12.1
(Daily Average)	5,903	6,619	+ 12.1
Demand:			
Runs to Stills, Total	2,094,867	2,371,168	+ 13.2
(Daily Average)	5,739	6,496	+ 13.2
Domestic Crude	1,918,854	2,189,385	+ 14.1
(Daily Average)	5,257	5,998	+ 14.1
Foreign Crude	176,013	181,783	+ 3.3
(Daily Average)	482	498	+ 3.3
Exports, Total	34,798	28,599	— 17.8
(Daily Average)	95	78	— 17.8
Transfers to Fuel Oil Stocks	7,862	8,870	+ 12.8
(Daily Average)	22	24	+ 12.8
Distillate Fuel Oil	2,537	2,850	+ 12.3
Residual Fuel Oil	5,325	6,020	+ 13.1
Used as Fuel, and Losses	16,925	7,428	— 56.1
(Daily Average)	47	20	— 56.1
Demand, Total	2,154,452	2,416,065	+ 12.1
(Daily Average)	5,903	6,619	+ 12.1
KEROSINE			
Production, Total	118,512	135,056	+ 14.0
(Daily Average)	325	370	+ 14.0
Percent Yield from Crude	5.6	5.7	.....
Imports, Total	245	.....	.....
(Daily Average)	1	.....	.....
Change in Stocks	—1,165	+5,417	.....
(Daily Average)	—3	+15	.....
Stocks, Beginning of Period	20,888	19,723	— 5.6
Stocks, End of Period	19,723	25,140	+ 27.5
(Days' Supply)	60	71	+ 18.3
Demand, Total	119,922	129,639	+ 8.1
(Daily Average)	329	355	+ 8.1
Exports, Total	2,076	7,614	+266.8
(Daily Average)	6	21	+266.8
Domestic Demand	117,846	122,025	+ 3.5
(Daily Average)	323	334	+ 3.5

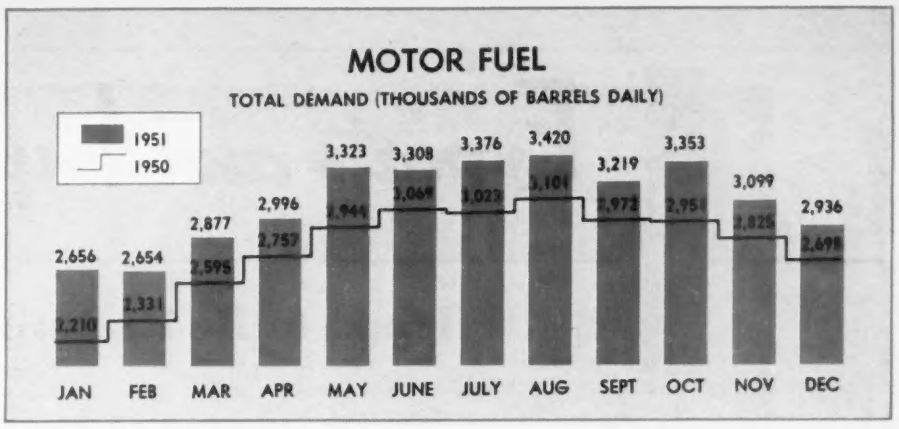
ITEM	Year 1950	Year 1951	% Diff. '50-'51
MOTOR FUEL			
Production, Total	1,024,448	1,140,934	+ 11.4
(Daily Average)	2,807	3,126	+ 11.4
Refinery Gasoline, Total	903,454	1,010,730	+ 11.9
(Daily Average)	2,475	2,769	+ 11.9
Percent Yield from Crude	43.0	42.4	.....
Natural Gasoline, etc.	181,558	205,501	+ 13.2
(Daily Average)	497	563	+ 13.2
Less Sales of L.P.G.	57,795	72,410	+ 25.3
Less Transfers Cycle Prods.	2,927	3,122	+ 6.7
Benzol	158	235	+ 48.7
Imports, Total	156	402	+157.7
(Daily Average)	.....	1	.....
Change in Stocks	+5,607	+8,128	.....
(Daily Average)	+15	+22	.....
Stocks, Beginning of Period	110,417	116,024	+ 5.1
Finished Gasoline	103,586	108,669	+ 4.9
Natural Gasoline	6,831	7,355	+ 7.7
Stocks, End of Period	116,024	124,152	+ 7.0
(Days' Supply)	42	40	— 4.8
Finished Gasoline	108,669	115,752	+ 6.5
Natural Gasoline	7,355	8,400	+ 14.2
Demand, Total	1,018,997	1,133,208	+ 11.2
(Daily Average)	2,792	3,105	+ 11.2
Exports, Total	24,585	39,941	+ 62.5
(Daily Average)	67	110	+ 62.5
Domestic Demand	994,412	1,093,267	+ 9.9
(Daily Average)	2,725	2,995	+ 9.9
DISTILLATE FUEL OIL			
Production, Total	398,912	477,149	+ 19.6
(Daily Average)	1,093	1,307	+ 19.6
Percent Yield from Crude	19.0	21.0	.....
Transfers from Crude	2,537	2,850	+ 12.3
(Daily Average)	7	8	+ 12.3
Imports, Total	2,340	1,835	— 21.6
(Daily Average)	6	5	— 21.6
Change in Stocks	—3,487	+10,585	.....
(Daily Average)	—10	+29	.....
Stocks, Beginning of Period	75,435	71,948	— 4.6
Stocks, End of Period	71,948	82,533	+ 14.7
(Days' Supply)	64	64	.....
Demand, Total	407,276	471,249	+ 15.7
(Daily Average)	1,116	1,291	+ 15.7
Exports, Total	12,579	23,007	+ 82.9
(Daily Average)	35	63	+ 82.9
Domestic Demand	394,697	448,242	+ 13.6
(Daily Average)	1,081	1,228	+ 13.6
RESIDUAL FUEL OIL			
Production, Total	425,217	469,188	+ 10.3
(Daily Average)	1,165	1,285	+ 10.3
Percent Yield from Crude	20.2	19.7	.....
Transfers from Crude	5,325	6,020	+ 13.1
(Daily Average)	15	16	+ 13.1
Imports, Total	119,186	118,258	— 0.8
(Daily Average)	326	324	— 0.8
Change in Stocks	—19,443	+1,698	.....
(Daily Average)	—53	+5	.....
Stocks, Beginning of Period	60,193	40,750	— 32.3
Stocks, End of Period	40,750	42,448	+ 4.2
(Days' Supply)	26	26	.....
Demand, Total	569,171	591,768	+ 4.0
(Daily Average)	1,559	1,621	+ 4.0
Exports, Total	16,227	30,047	+ 85.2
(Daily Average)	44	82	+ 85.2
Domestic Demand	552,994	561,721	+ 1.6
(Daily Average)	1,515	1,539	+ 1.6
LUBRICANTS			
Production, Total	51,735	62,178	+ 20.2
(Daily Average)	142	170	+ 20.2
Percent Yield from Crude	2.5	2.6	.....
Imports, Total	.....	.....	.....
(Daily Average)	.....	.....	.....
Change in Stocks	—1,370	+1,551	.....
(Daily Average)	—4	+4	.....
Stocks, Beginning of Period	9,219	7,849	— 14.9
Stocks, End of Period	7,849	9,400	+ 19.8
(Days' Supply)	54	57	+ 5.6
Demand, Total	53,105	60,627	+ 14.2
(Daily Average)	146	166	+ 14.2
Exports, Total	14,229	17,703	+ 24.4
(Daily Average)	39	49	+ 24.4
Domestic Demand	38,876	42,924	+ 10.4
(Daily Average)	107	117	+ 10.4

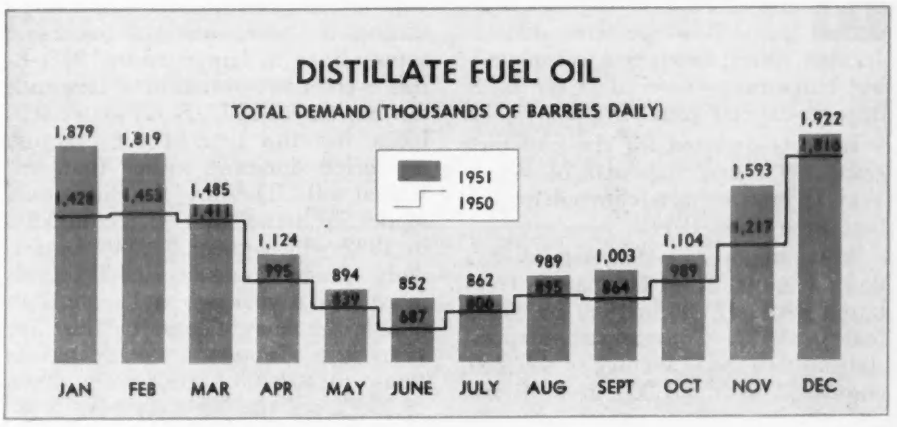
daily average total demand will increase only 6.9 percent in 1952 after rising 11.2 percent in 1951. But domestic demand of 3,243,000 daily in 1952 will be 248,000 barrels or 8.3 percent over the 2,995,000 daily of 1951, which was 270,000 barrels or 9.9 percent over the 2,725,000 per day of 1950.

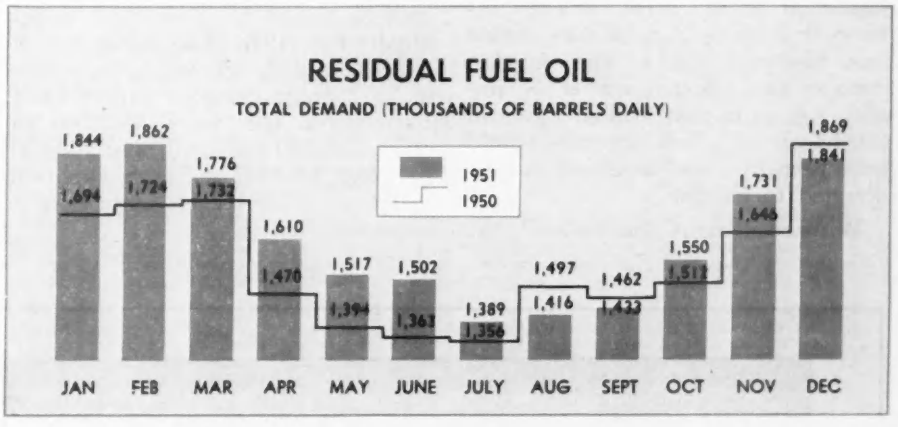
Kerosine daily average total demand will increase only 5.4 percent in 1952, compared with 8.1 percent in 1951. But domestic demand of 361,000 barrels daily in 1952 will be 27,000 barrels or 8.1 percent over the 334,000 of 1951, which had been only 11,000 barrels or 3.5 percent above the 323,000 in 1950.

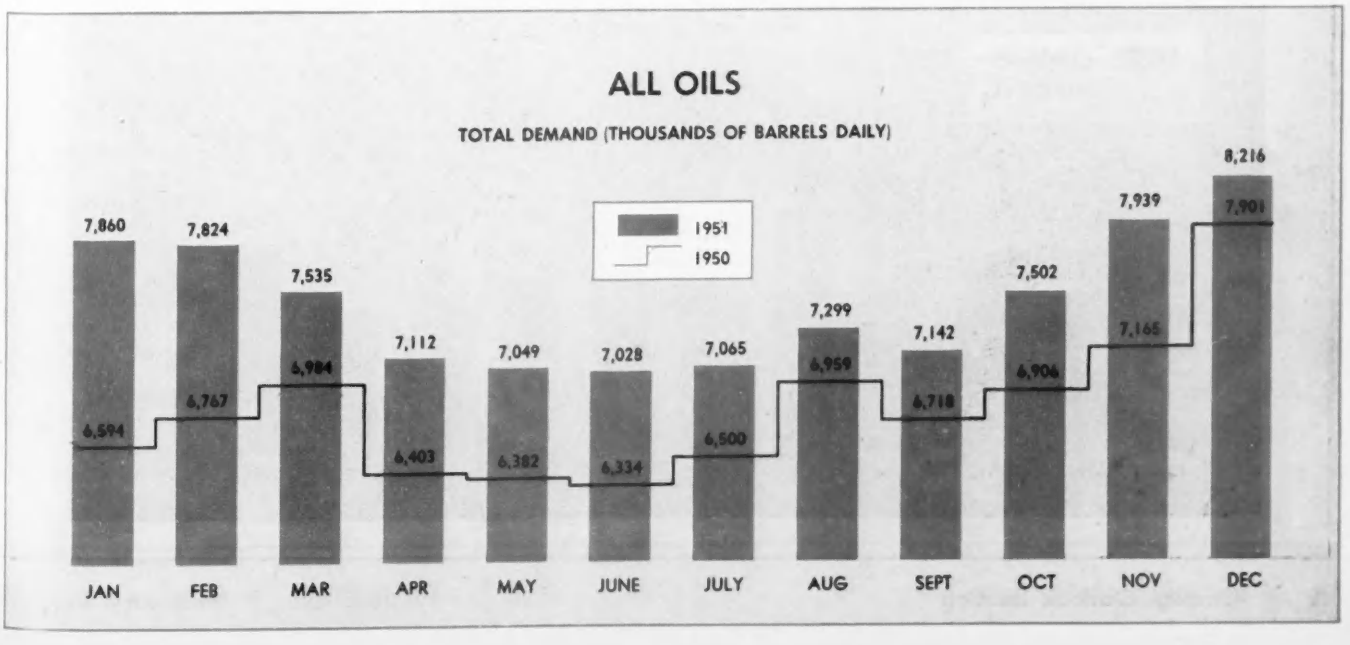
The gain in daily average total demand for distillate fuel oil in 1952 will be held to 7.0 percent, in contrast with the gain of 15.7 percent in 1951, because of lower exports and a slowing down in growth of domestic demand. Domestic requirements of 1,333,000 barrels daily will be 105,000 barrels per day or 8.5 percent more than the 1,228,000 daily of 1951, which was 147,000 barrels or 13.6 percent more than the 1,081,000 daily in 1950.

Residual fuel oil total demand of 1,626,000 barrels per day predicted for 1952 would be virtually the same as in 1951, whereas 1951 had shown a 4 percent increase. Lower exports will be responsible for the failure to show more than a nominal increase, as domestic demand of 1,571,000 barrels daily in 1952 would be 32,000 a day or 2.1 percent above the 1,539,000 daily of 1951, which was 24,000 barrels or 1.6 percent over the 1,515,000 daily of 1950.









Exports and Imports

Trend to Be Restored

HEIGHTENED world demand and disruption of the petroleum flow pattern due to Iranian unrest brought a complete—but temporary—reversal of the U. S. imports-exports trend in 1951.

Imports declined for the first time since 1942, first full year of World War II, and exports climbed for the first time since 1947.

Total imports in 1951 lagged to a daily average of 841,800 barrels compared with 847,000 in 1950 and 645,000 in 1949. Contrariwise, exports shot up to a daily average of 427,200, compared with 304,200 in 1950 and 327,100 in 1949.

Exports were stimulated by the shutdown of the great Abadan refinery in Iran as U. S. oil was turned into European tanks. The Abadan impasse also affected the U. S. imports figures in that Middle East and Caribbean oil which normally would have been tankered to the U. S. was diverted to Europe.

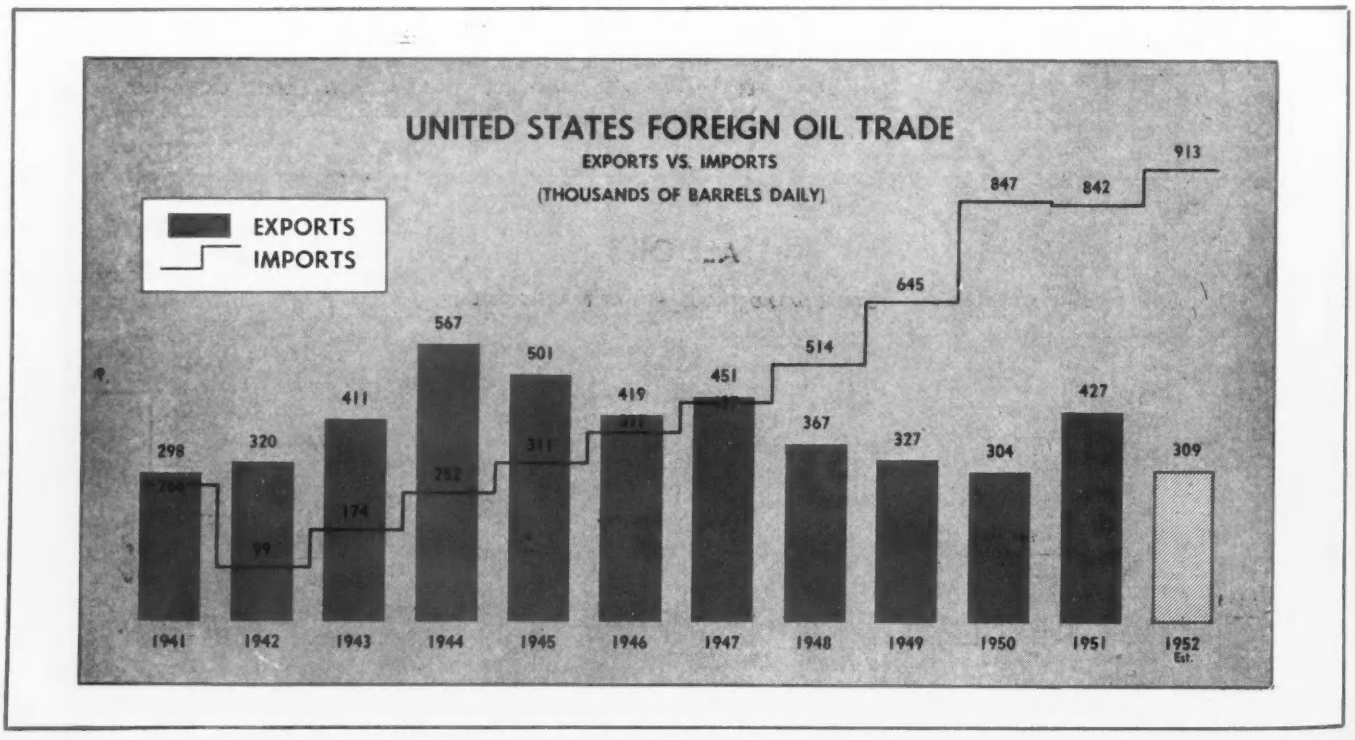
With or without Abadan's oil, the former U. S. imports-exports trend will be restored in 1952—unless a large-scale war cuts the incoming supply lines, as happened in 1942. In this event there would be a tremendous movement of U. S. oil to overseas bases, but this type of consumption is labeled domestic rather than exported oil. The U. S. Bureau of Mines estimates that U. S. imports in 1952 will average 912,600 barrels daily, which would be 70,800 barrels more than a year ago and more than double the amount imported just five years ago. Exports are expected to slump to 308,700 barrels daily, down 18,500 from the previous year.

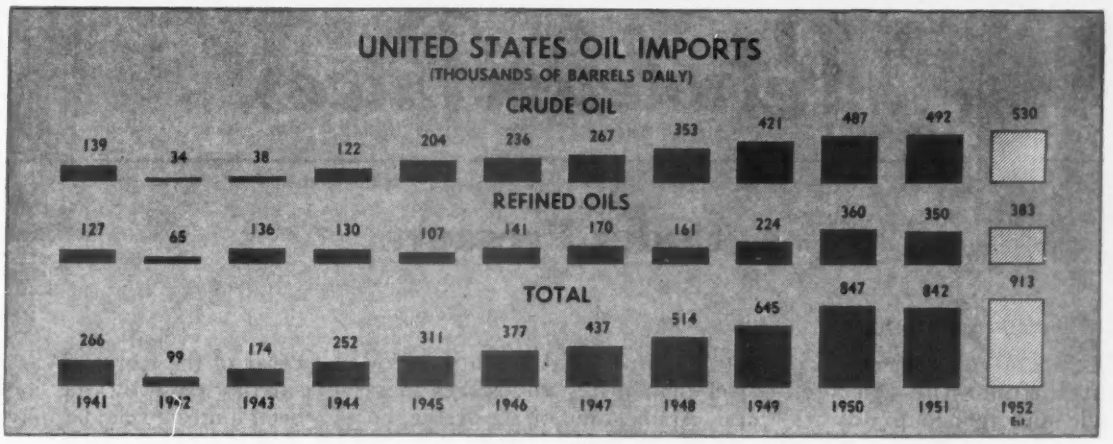
The estimates for 1952 would mean the greatest imports-exports difference since the U. S. became a net importer in 1948. This difference of 603,900 barrels on the imports side in 1952 would compare with 414,601 barrels for last year; 542,800 for 1950; 318,300 for 1949; and 146,600 for 1948. In 1947 the U. S. exported a net of 13,900 barrels more than it imported.

Increased pipe line outlets to Mediterranean and Persian Gulf ports, and additions to world tanker fleets are expected to boost U. S. petroleum imports this year, with increased rates starting possibly as early as the second quarter. More than one-half of the Middle East crude scheduled for late 1951 entry into the U. S. was channeled to European refineries to fill the gap left by the Iranian shutdown.

Sharp hikes in Middle East production made recently to overcome the Iranian shortage should insure European plants adequate supplies without the need for diverting Middle East crude intended for U. S and Canadian markets.

Full impact of renewed heavy imports of Middle East oil into U. S. is not expected until the third quarter, when total imports are expected to jump from 868,000 to 913,000 barrels daily. A million barrels a day are expected during the last three months of 1952.

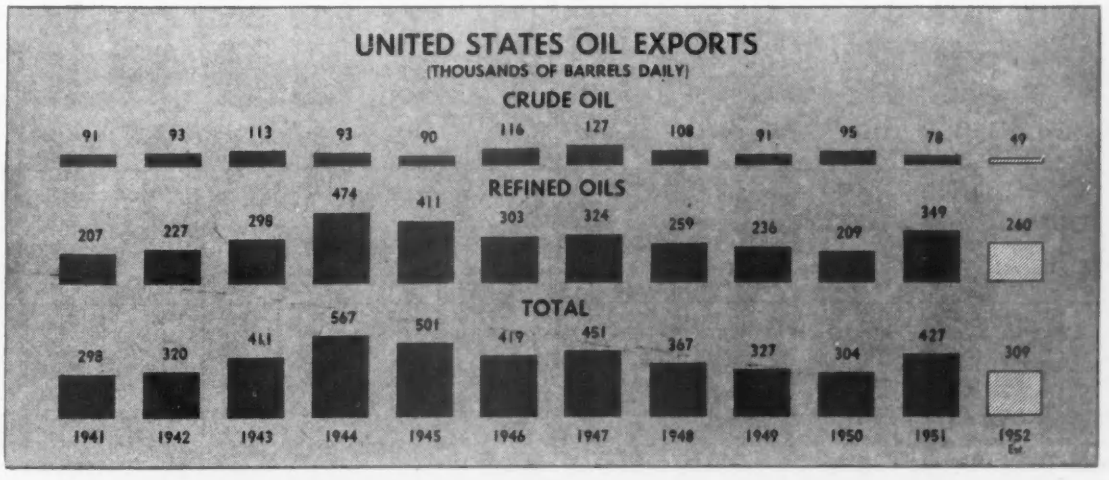




(All Figures in Barrels)

YEAR	IMPORTS						EXPORTS					
	CRUDE OIL		REFINED PRODUCTS		TOTAL IMPORTS		CRUDE OIL		REFINED PRODUCTS		TOTAL EXPORTS	
	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average
1918	37,736,000	103,400	1,227,000	3,400	38,963,000	106,800	5,884,000	16,100	62,234,000	170,500	68,118,000	186,600
1919	52,822,000	144,700	1,376,000	3,800	54,198,000	148,500	6,348,000	17,400	57,545,000	157,600	63,893,000	175,100
1920	106,175,000	290,100	2,647,000	7,200	108,822,000	297,300	9,295,000	25,400	70,323,000	192,100	79,618,000	217,500
1921	125,364,000	343,500	3,428,000	9,400	128,792,000	352,900	9,527,000	26,400	62,254,000	170,500	71,881,000	196,900
1922	130,255,000	356,800	5,719,000	15,700	135,974,000	372,500	10,805,000	29,600	63,745,000	174,600	74,550,000	204,200
1923	82,015,000	224,700	17,638,000	48,300	99,653,000	273,000	17,534,000	48,000	84,800,000	232,300	102,334,000	280,300
1924	77,775,000	212,500	16,806,000	45,900	94,581,000	258,400	18,239,000	49,800	99,089,000	270,700	117,328,000	320,500
1925	61,824,000	169,400	16,376,000	44,900	78,200,000	214,300	13,337,000	36,500	100,684,000	275,900	114,021,000	312,400
1926	60,382,000	165,400	20,938,000	57,400	81,320,000	222,800	15,407,000	42,200	116,999,000	320,606	132,406,000	362,800
1927	58,383,000	159,900	13,353,000	36,600	71,736,000	196,500	15,844,000	43,400	126,419,000	346,400	142,263,000	389,800
1928	79,767,000	218,000	11,790,000	32,200	91,557,000	250,200	18,966,000	51,800	135,991,000	371,600	154,957,000	423,400
1929	78,933,000	216,200	29,777,000	81,600	108,710,000	297,800	26,401,000	72,300	136,719,000	374,600	163,120,000	446,900
1930	62,129,000	170,200	43,489,000	119,200	105,618,000	289,400	23,705,000	64,900	132,790,000	363,800	156,495,000	428,700
1931	47,250,000	129,500	38,837,000	106,400	86,087,000	235,900	25,535,000	70,000	98,819,000	270,700	124,354,000	340,700
1932	44,682,000	122,100	29,812,000	81,400	74,494,000	203,500	27,393,000	74,900	75,882,000	207,300	103,275,000	282,200
1933	31,893,000	87,400	13,501,000	37,000	45,394,000	124,400	36,584,000	100,200	70,143,000	192,200	106,727,000	292,400
1934	35,558,000	97,400	14,936,000	40,900	50,494,000	138,300	41,127,000	112,700	73,380,000	201,000	114,507,000	313,700
1935	32,239,000	88,300	20,396,000	55,900	52,635,000	144,200	51,430,000	140,900	77,557,000	212,500	128,987,000	353,400
1936	32,327,000	88,300	24,777,000	67,700	57,104,000	156,000	50,313,000	137,400	81,681,000	223,300	131,994,000	360,600
1937	27,484,000	75,300	29,673,000	81,300	57,157,000	156,600	67,234,000	184,200	105,600,000	289,300	172,834,000	473,500
1938	26,412,000	72,400	27,896,000	76,400	54,308,000	148,800	77,254,000	211,700	116,474,000	319,100	193,728,000	530,800
1939	33,095,000	90,700	25,965,000	71,100	59,060,000	161,800	72,076,000	197,500	116,883,000	320,200	188,959,000	517,700
1940	42,662,000	116,600	41,089,000	112,200	83,751,000	228,800	51,496,000	140,700	78,970,000	215,800	130,466,000	356,500
1941	50,606,000	138,700	46,536,000	127,500	97,142,000	266,200	33,238,000	91,100	75,592,000	207,100	108,830,000	298,200
1942	12,297,000	33,700	23,669,000	64,800	35,966,000	98,500	33,834,000	92,700	83,073,000	227,600	116,907,000	320,300
1943	13,833,000	37,900	49,579,000	135,800	63,412,000	173,700	41,342,000	113,200	108,615,000	297,600	149,957,000	410,800
1944	44,805,000	122,400	47,506,000	129,800	92,311,000	252,200	34,238,000	93,500	173,378,000	473,700	207,616,000	567,200
1945	74,337,000	203,600	39,282,000	107,600	113,619,000	311,200	32,998,000	90,400	149,985,000	410,900	182,983,000	501,300
1946	86,066,000	235,800	51,610,000	141,400	137,676,000	377,200	42,436,000	116,300	110,687,000	303,200	153,123,000	419,500
1947	97,532,000	267,200	61,857,000	169,500	159,389,000	436,700	46,355,000	127,000	118,122,000	323,600	164,477,000	450,600
1948	129,093,000	352,700	59,051,000	161,300	188,144,000	514,000	39,736,000	108,200	94,938,000	259,100	134,674,000	367,400
1949	153,686,000	421,100	81,873,000	224,300	235,559,000	645,400	33,069,000	90,600	86,307,000	236,500	119,376,000	327,100
1950	177,714,000	486,900	131,435,000	360,100	309,149,000	847,000	34,798,000	95,300	76,237,000	208,900	111,035,000	304,200
1951	179,425,000	491,600	127,807,000	350,200	307,232,000	841,800	28,599,000	78,300	127,339,000	348,900	155,938,000	427,200
1952 Est.	194,000,000	530,100	140,000,000	382,500	334,000,000	912,600	18,000,000	49,200	95,000,000	259,500	113,000,000	308,700

Source: U. S. Bureau of Mines, except 1951 includes estimates for November and December.



Petroleum Prices

Under Pressure

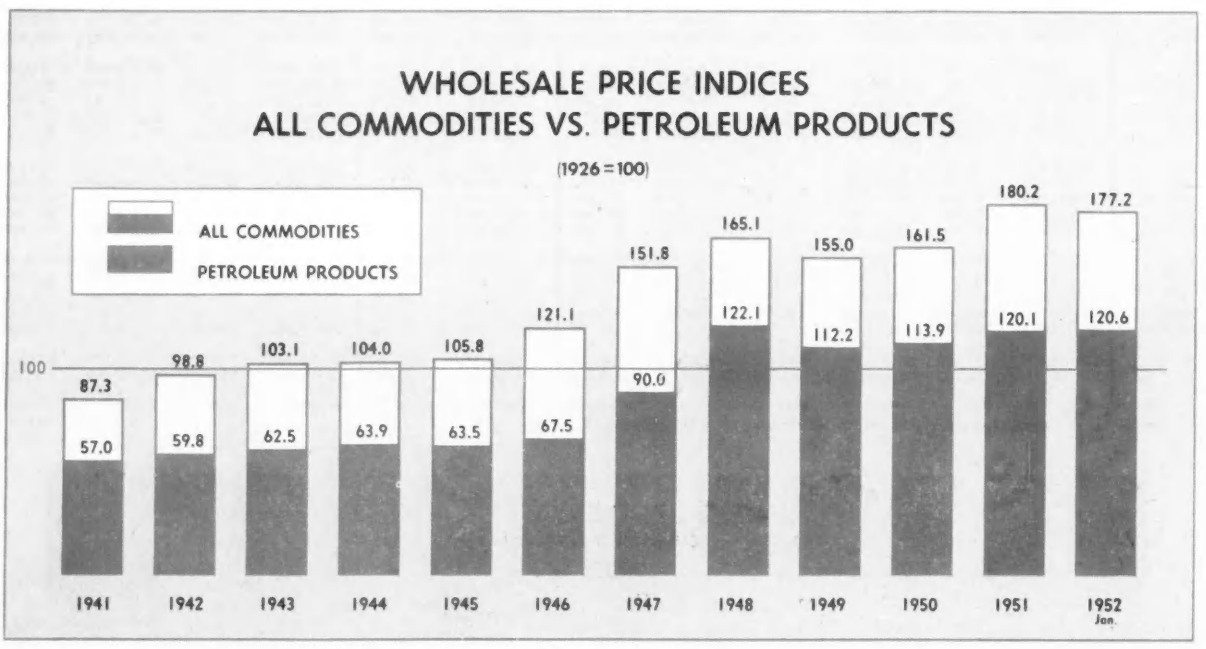
BECAUSE of government price restrictions, the prices of crude and refined products have continued unchanged at the levels where they were frozen in late January, 1951.

The frozen prices have become a matter of increasing concern in the industry, and some efforts are being made to secure revisions to compensate for increased oil industry costs. Judging by experience during and after World War II, it will be difficult, however, if not impossible, to secure such adjustments as long as price controls remain in effect.

The petroleum industry price ceilings are inequitable in that they peg petroleum prices at a relatively lower level than prices and wages in general. At the time of the freeze, commodities in general had increased about 16 percent above the pre-Korea level, while petroleum and petroleum products in the aggregate were only about 7 percent above 1949's depressed market level. In the case of crude, there is no increase. There has been no general crude price raise since late 1947, and the present average price of about $2.56 per barrel actually is less than the $2.60 that prevailed in 1948.

In contrast, oil industry costs have increased substantially since the outbreak of the Korean War. Wages and salaries paid by the industry have been increased moderately, and prices of materials and equipment advanced sharply in the latter half of 1950 and were kept in effect by the general price freeze.

While crude prices have remained practically unchanged since the last general increase in posted prices of 50 cents a barrel was made in December, 1947, costs of practically everything the industry must have to continue operations have gone up. In the interval 1948-1951, the costs of casing, drill pipe and tubing were hiked 24 to 30 percent; industry wage



YEAR	All Commodities	Petroleum	YEAR	All Commodities	Petroleum	YEAR	All Commodities	Petroleum	YEAR	All Commodities	Petroleum	YEAR	All Commodities	Petroleum
1918	131.3	135.3	1925	103.5	95.0	1932	64.8	45.4	1939	77.1	52.2	1946	121.1	67.5
1919	138.6	128.0	1926	100.0	100.0	1933	65.9	41.0	1940	78.6	50.0	1947	151.8	90.0
1920	154.4	183.5	1927	95.4	72.7	1934	74.9	50.5	1941	87.3	57.0	1948	165.1	122.1
1921	97.6	104.4	1928	96.7	72.0	1935	80.0	51.3	1942	98.8	59.8	1949	155.0	112.2
1922	96.7	102.9	1929	95.3	71.3	1936	80.8	57.3	1943	103.1	62.5	1950	161.5	113.9
1923	100.6	82.6	1930	86.4	61.5	1937	86.3	60.5	1944	104.0	63.9	1951	180.2	120.1
1924	98.1	83.5	1931	73.0	39.5	1938	78.6	55.9	1945	105.8	63.5	1952 (Jan).	177.2	120.6

Source: Survey of Current Business.

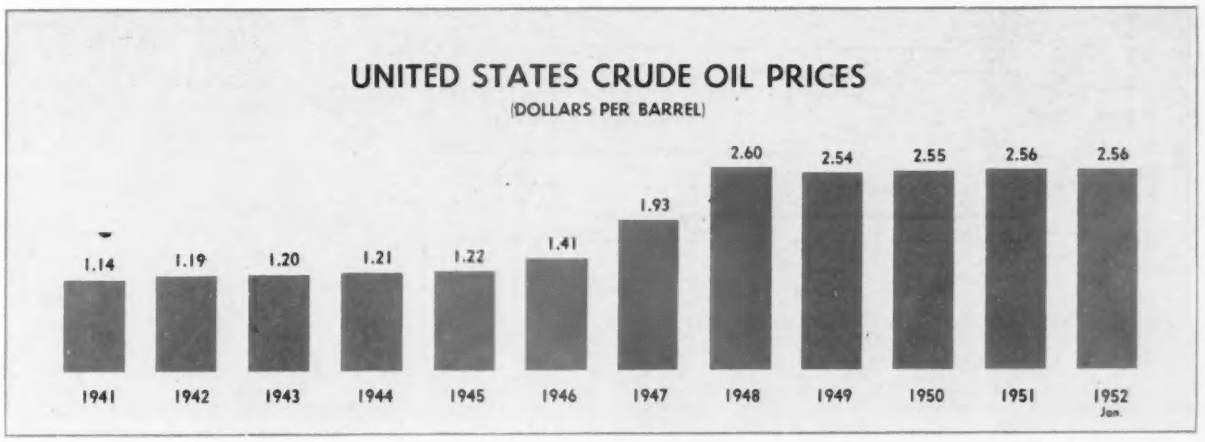
rates have increased as much as 36 percent; some pumping equipment costs have increased about 19 percent; and other field equipment has risen as much as 32 percent in price.

As a matter of promoting the national safety and welfare, the return of petroleum prices to a competitive basis is highly desirable. Adequate price for crude is necessary to induce operators to carry out the drilling and development required to keep the country amply supplied with oil. Prices frozen at inadequate levels will promote scarcity of oil, as they did in the World War II period.

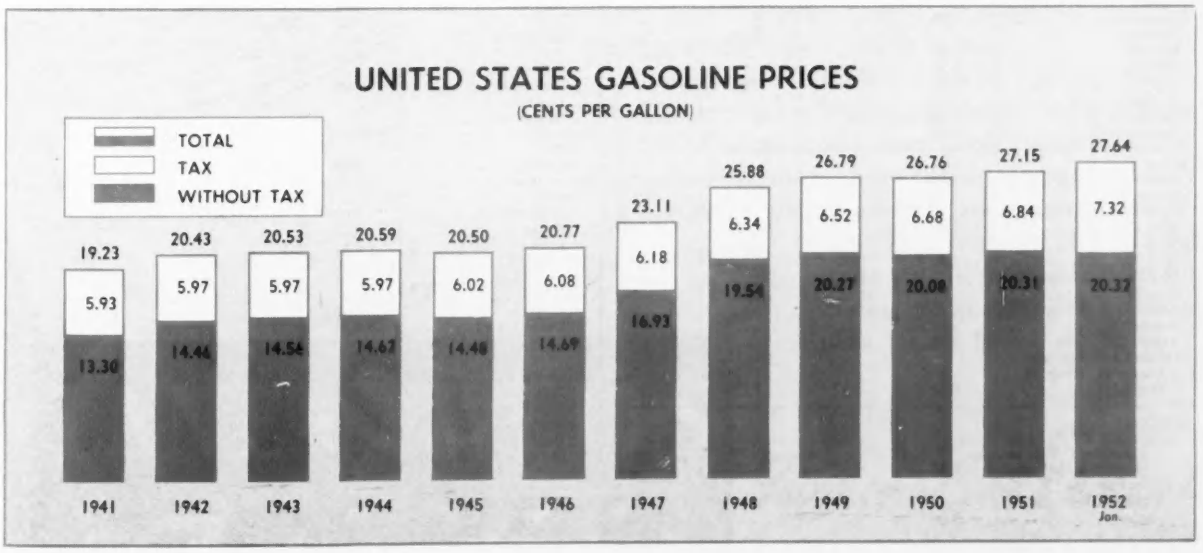
The national average crude price posting in 1951 was $2.56 per barrel, up 1 cent from 1950 and 2 cents greater than in 1949, but down 4 cents from the 1948 average.

The small gain in 1951 over the preceding year represented improvement in prices during 1950 in Pennsylvania grade crudes and some advancement in late 1950 of heavy crudes in California. Postings for all principal grades remained unchanged during 1951, although the Office of Price Stabilization authorized revisions in some individual fields in order to remove inequities of various kinds.

Prices of petroleum and petroleum products in 1951 were only 20.1 percent higher than in 1926, whereas the wholesale prices of all commodities were 80.2 percent above the base year of the government price index, as charted herewith. In early 1952 there was no material change in the 1951 relationship of petroleum prices to

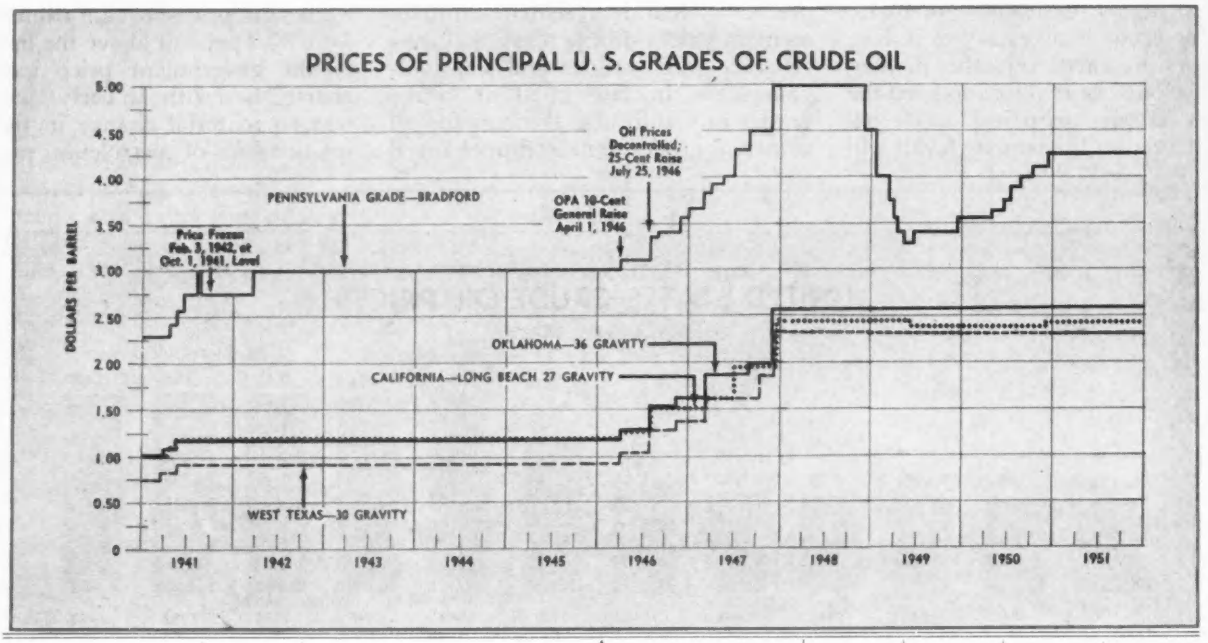


YEAR	CRUDE OIL DOLLARS PER BARREL	GASOLINE CENTS PER GALLON			YEAR	CRUDE OIL DOLLARS PER BARREL	GASOLINE CENTS PER GALLON			YEAR	CRUDE OIL DOLLARS PER BARREL	GASOLINE CENTS PER GALLON		
		50 Cities Average					50 Cities Average					50 Cities Average		
	At Wells	Without Tax	Tax	With Tax		At Wells	Without Tax	Tax	With Tax		At Wells	Without Tax	Tax	With Tax
1918	1.98	25.12	0.00	25.12	1931	.65	12.98	4.00	16.98	1942	1.19	14.46	5.97	20.43
1919	2.01	25.41	0.06	25.47	1932	.87	13.30	4.63	17.93	1943	1.20	14.56	5.97	20.53
1920	3.07	29.74	0.09	29.83	1933	.67	12.41	5.41	17.82	1944	1.21	14.62	5.97	20.59
1921	1.73	26.11	0.20	26.31	1934	1.00	13.64	5.21	18.85	1945	1.22	14.48	6.02	20.50
1922	1.61	24.82	0.38	25.20	1935	.97	13.55	5.29	18.84	1946	1.41	14.69	6.08	20.77
1923	1.34	21.06	0.91	21.97	1936	1.09	14.10	5.35	19.45	1947	1.93	16.93	6.18	23.11
1924	1.43	19.46	1.48	20.94	1937	1.18	14.59	5.40	19.99	1948	2.60	19.54	6.34	25.88
1925	1.68	20.09	2.11	22.20	1938	1.13	14.07	5.44	19.51	1949	2.54	20.27	6.52	26.79
1926	1.88	20.97	2.41	23.38	1939	1.02	13.31	5.44	18.75	1950	2.55	20.08	6.68	26.76
1927	1.30	18.29	2.80	21.09	1940	1.02	12.75	5.66	18.41	1951	2.56	20.31	6.84	27.15
1928	1.17	17.90	3.04	20.94	1941	1.14	13.30	5.93	19.23	1952 (Jan.)	2.56	20.36	7.32	27.64
1929	1.27	17.92	3.50	21.42										
1930	1.19	16.17	3.78	19.95										



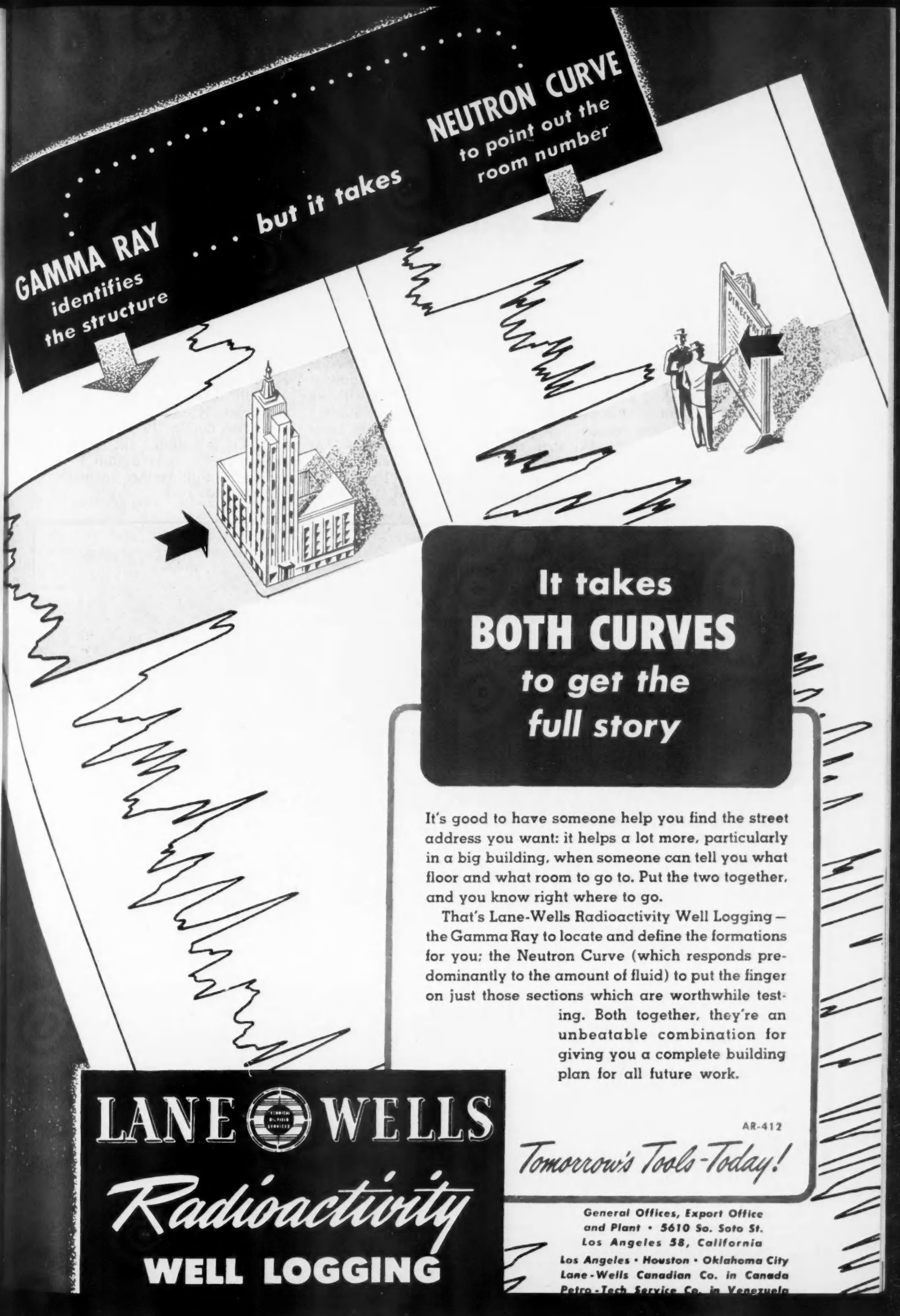
the prices of all commodities. The petroleum index was around 120.6 percent of the 1926 level, and all commodities were at 177.2 percent, off slightly from the 1951 average.

Gasoline prices, exclusive of taxes, at retail in 50 cities averaged approximately 20.31 cents per gallon in 1951, and as 1952 began was at about the same level, averaging 20.32 cents. This represented only a small increase over the average price of 20.08 cents a gallon of 1950 and was virtually no increase over the 20.27 cents average price of 1949.



DATE	Pennsylvania Grade, Bradford	Oklahoma-Kansas 36–36.9° Gravity	California, Long Beach 27–27.9° Gravity	W. Texas (Sour) 30–30.9° Gravity
1937—				
Prior to January 1	$2.15	$1.10	$1.10	$0.78
January 28	....	1.22	....	0.88
February 24	2.67	....	....	....
June 7	2.82	....	....	....
September 1	2.60	....	....	....
October 12	2.35	....	....	....
December 1	2.20	....	....	....
1938—				
March 7	2.05	....	....	....
June 13	1.80	....	....	....
September 1	1.68	....	....	....
October 12	....	1.02	....	0.75
1939—				
January 21	1.80	....	....	....
February 1	1.88	....	....	....
March 6	2.00	....	....	....
October 6	2.25	....	....	....
November 1	2.40	....	....	....
December 1	2.50	....	....	....
1940—				
January 1	2.75	....	....	....
February 1	....	....	1.03	....
May 22	2.50	....	....	....
June 18	2.25	....	....	....
July 12	2.00	....	....	....
August 18	1.85	....	....	....
November 12	2.00	....	....	....
December 17	2.15	....	....	....
1941—				
January 27	2.30	....	....	....
March 29	....	....	....	0.82
April 1	....	1.07	....	....
April 23	2.40	....	....	....
April 24	....	....	1.09	....
May 20	2.55	1.17	....	....
May 21	....	....	....	0.92
May 23	....	....	1.15	....
June 18	2.75	....	....	....
August 14	2.98	....	....	....
August 23	2.75	....	....	....
October 1 (Prices later frozen at levels of this date)	2.75	1.17	1.15	0.92
1942—				
February 3 (Prices frozen by O.P.A. at October 1, 1941 level)	2.75	1.17	1.15	0.92
March 26 (O. P. A. granted Penn. Grade raise)	3.00	....	....	....

DATE	Pennsylvania Grade, Bradford	Oklahoma-Kansas 36–36.9° Gravity	California, Long Beach 27–27.9° Gravity	W. Texas (Sour) 30–30.9° Gravity
1943—(Prices frozen)	$3.00	$1.17	$1.15	$0.92
1944—(Prices frozen)	....	....	....	....
1945—(Prices frozen)	....	....	....	....
1946—				
April 1 (O.P.A. 10c Raise)	3.10	1.27	1.25	1.02
July 25 (Oil Prices Decontrolled)	....	1.52	....	1.27
August 1	3.35	....	1.50	....
September 1	3.41	....	....	....
November 15	....	1.62	....	....
November 19	....	....	....	1.37
December 9	3.55	....	....	....
1947—				
January 1	3.65	....	....	....
March 1	3.81	....	....	....
March 10	....	1.87	....	1.62
March 19	....	....	1.75	....
April 1	3.91	....	....	....
May 16	4.05	....	....	....
July 1	4.30	....	1.95	....
September 1	4.50	....	....	....
October 15	....	2.07	....	....
October 16	....	....	....	1.82
December 1	5.00	....	....	....
December 6	....	2.57	....	2.32
December 27	....	....	2.45	....
1948—				
December 11	4.50	....	....	....
1949—				
January 21	4.00	....	....	....
March 11	3.75	....	....	....
April 1	3.55	....	....	....
April 13	3.40	....	....	....
May 11	3.27	....	....	....
June 1	....	....	2.37	....
June 16	3.40	....	....	....
December 12	3.54	....	....	....
1950—				
May 1	3.65	....	....	....
June 21	3.75	....	....	....
July 19	3.89	....	....	....
August 25	4.00	....	....	....
October 9	4.10	....	....	....
December 9	4.25	....	....	....
December 12	....	....	2.41	....
1951—(Prices frozen at Jan. 25 level)	4.25	2.57	2.41	2.32


GAMMA RAY
identifies
the structure
. . . but it takes
NEUTRON CURVE
to point out the
room number
It takes
BOTH CURVES
to get the
full story
It's good to have someone help you find the street address you want: it helps a lot more, particularly in a big building, when someone can tell you what floor and what room to go to. Put the two together, and you know right where to go.
That's Lane-Wells Radioactivity Well Logging — the Gamma Ray to locate and define the formations for you; the Neutron Curve (which responds predominantly to the amount of fluid) to put the finger on just those sections which are worthwhile testing. Both together, they're an unbeatable combination for giving you a complete building plan for all future work.
AR-412
Tomorrow's Tools-Today!
LANE WELLS
Radioactivity
WELL LOGGING
General Offices, Export Office and Plant • 5610 So. Soto St.
Los Angeles 58, California
Los Angeles • Houston • Oklahoma City
Lane-Wells Canadian Co. in Canada
Petro-Tech Service Co. in Venezuela

Stocks of Oils

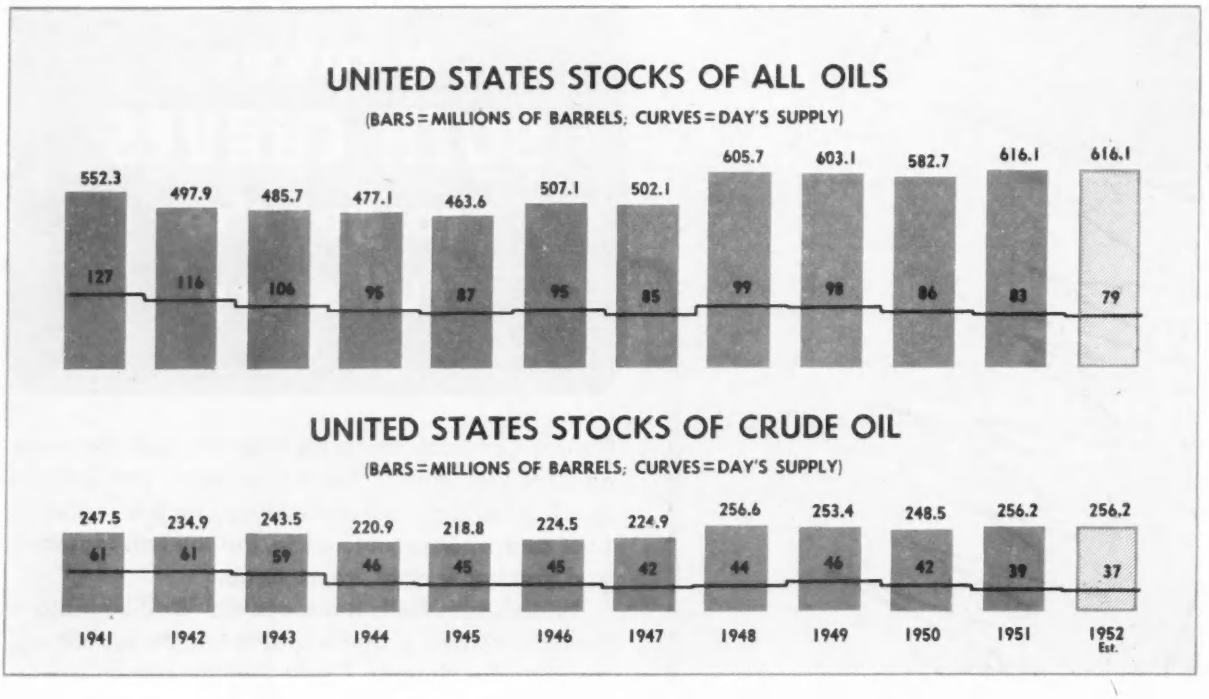
At Desirable Levels

U. S. oil stocks are at desirable levels in this early part of 1952. They were increased substantially in 1951, but demand for crude and products also expanded materially. In terms of days' supply at the prevailing rate of demand, stocks of distillate fuel oil and residual fuel oil were the same at the end of 1951 as at the end of 1950, distillate inventory having represented 64 days' supply and residual 26 days' supply. Kerosine stocks were relatively greater, having been equivalent to 71 days' supply compared with 60. Stocks of lubricants were equal to 57 days' requirements compared with 54. Motor fuel stocks were the only major product stocks at relatively lower level than a year ago, having been equivalent to 40 days' supply at the end of 1951 compared with 42 days' supply at the close of 1950.

Crude stocks were relatively lower than those of refined products. At the end of 1951 they represented 39 days' supply, against 42 days' requirements at the end of 1950.

Reflecting the situation of crude stocks and motor fuel, which were relatively lower than a year ago, stocks of all oils in the aggregate at the end of 1951 represented 83 days' supply, compared with 86 days' needs at the end of 1950.

While the present levels of stocks are generally satisfactory, some net additions during 1952 will be required if inventories are to be kept in the present relationship to consumption, with further increases in demand indicated.



End of Year	ALL OILS Barrels	ALL OILS Days' Supply	CRUDE OIL Barrels Refinable	CRUDE OIL Days' Supply
1918	193,411,000	165	144,336,000	125
1919	200,383,000	164	149,356,000	127
1920	209,845,000	156	149,448,000	103
1921	294,428,000	203	217,324,000	150
1922	385,349,000	232	295,708,000	181
1923	492,088,000	235	340,637,000	169
1924	520,287,000	236	360,475,000	171
1925	552,464,000	239	345,863,000	150
1926	527,084,000	210	315,029,000	133
1927	597,176,000	231	379,660,000	155
1928	621,010,000	224	392,629,000	148
1929	689,166,000	228	428,445,000	149
1930	665,497,000	224	411,882,000	153
1931	621,673,000	221	370,194,000	144
1932	590,106,000	230	339,875,000	145
1933	602,198,000	226	354,223,000	140
1934	564,350,000	199	337,254,000	128
1935	541,700,000	178	314,855,000	109
1936	519,229,000	155	288,579,000	91
1937	564,728,000	154	305,833,000	87
1938	567,703,000	156	274,165,000	79
1939	525,838,000	135	238,910,000	66
1940	563,277,000	141	264,079,000	70
1941	552,328,000	127	247,499,000	61
1942	497,940,000	116	234,889,000	61
1943	485,698,000	106	243,506,000	59
1944	477,089,000	95	220,862,000	46
1945	463,579,000	87	218,763,000	45
1946	507,094,000	95	224,473,000	45
1947	502,053,000	85	224,929,000	42
1948	607,856,000	99	246,572,000	43
			All Crude	
*1948	605,743,000	99	256,627,000	44
1949	603,119,000	98	253,356,000	46
1950	582,710,000	86	248,463,000	42
1951	616,064,000	83	256,227,000	39
1952 Est.	616,064,000	79	256,227,000	37

* Revised; new basis.

In its annual forecast of petroleum demand and supply, presented elsewhere in this issue, the U. S. Bureau of Mines made no assumption of any net changes in stocks during 1952 in calculating supplies to be needed, although allowing for seasonal changes in stocks of refined products. However, the industry may find it advisable to make some net additions to stocks during the year, especially as regards crude and motor fuel.

An increase of 5.1 percent in total demand for all oils is forecast for 1952. If stocks of all oils were increased similarly from their end of 1951 level of 616,064,000 barrels, they would be expanded by about 31 million barrels and total 647 million barrels at the end of 1952. This would be about 83 days' supply, as was the end of 1951 total.

Crude demand is expected to average 6,866,000 barrels daily in 1952, an increase of 3.7 percent. If crude stocks were to be increased similarly and made to equal 39 days' supply at the end of 1952, as at the end of 1951, they would have to total 267.8 million barrels. That would be an increase of 11.6 million barrels over the 256,227,000 barrels in storage at the end of 1951.

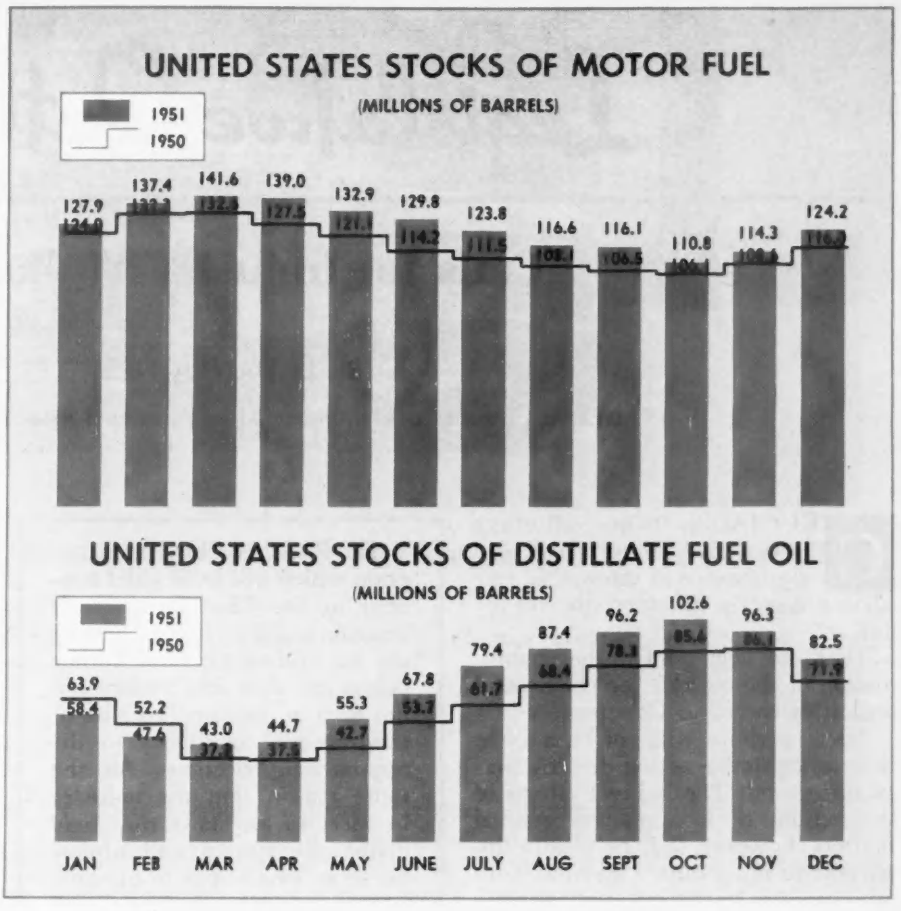
Motor fuel daily average total demand in 1952 will be 6.9 percent greater than in 1951, it is predicted. If stocks should be similarly increased or made to equal 40 days' supply at the end of 1952 as at the end of 1951, they would have to be raised 8.6 million barrels over the 124,152,000 barrels held at the end of 1951, or to 132.7 million barrels.

Daily average total demand for distillate fuel oil is expected to show an increase of 7 percent in 1952. If stocks were increased the same amount and kept equivalent to 64 days' supply, as at the end of both 1950 and 1951, they would be raised 5.8 million barrels, from 82,533,000 barrels at the end of 1951 to 88.3 million barrels at the end of 1952.

Kerosine daily average demand will increase 5.4 percent in 1952, it is forecast. The same increase in stocks would amount to 1.4 million barrels and raise the quantity in storage from 25,140,000 barrels at the end of 1951 to 26.5 million at the end of 1952.

Residual fuel oil daily average demand is expected to show practically no increase in 1952, indicating that no material addition to stocks will be needed.

Daily average demand for other refined products not mentioned above will be about 4.4 percent larger in 1952 than in 1951, it is estimated.



Stocks of Crude Petroleum in U. S. by Grades, at End of December

(Based on Weekly Reports of U. S. Bureau of Mines)

(THOUSANDS OF BARRELS)

GRADE or ORIGIN	Dec. 30, 1950	Dec. 29 1951	Changes 1950-1951
Pennsylvania Grade	2,079	1,881	— 198
Other Appalachian	1,299	1,875	+ 576
Lima-Michigan	674	589	— 85
Illinois-Indiana	9,145	11,350	+2,205
Arkansas	2,608	2,911	+ 303
Kansas	10,055	10,574	+ 519
Louisiana	14,059	13,737	— 322
Northern	2,638	2,803	+ 165
Gulf Coast	11,421	10,934	— 487
Mississippi	2,424	3,330	+ 906
New Mexico	6,985	7,369	+ 384
Oklahoma	29,114	30,316	+1,202
Texas	119,093	124,082	+4,989
East Texas	14,845	14,609	— 236
West Texas	47,049	53,926	+6,877
Gulf Coast	28,232	26,345	—1,887
Other Texas	28,967	29,202	+ 235
Panhandle	3,747	4,241	+ 494
North	8,310	9,436	+1,126
South	7,240	5,746	—1,494
Other	9,670	9,779	+ 109
Rocky Mountain	11,475	13,223	+1,748
California	31,155	29,821	—1,334
Foreign	7,598	5,379	—2,219
Total in U. S.	247,763	256,437	+8,674

Stocks of Major Petroleum Products Held by Refining Companies in the United States at End of December, 1951, and 1950

Stock at refineries, at bulk terminals, in transit, and in pipe lines. Data for 1950 from Bureau of Mines monthly reports; for 1951 from weekly reports of American Petroleum Institute.

(Stocks at End of December, in Thousands of Barrels)

DISTRICT	Finished and Unfinished Gasoline		Kerosine		Distillate Fuel Oil		Residual Fuel Oil	
	1950	1951	1950	1951	1950	1951	1950	1951
East Coast	24,574	24,805	8,140	9,106	21,986	27,019	9,912	10,107
Appalachian	3,958	4,110	512	824	794	1,102	499	894
District 1	2,807	2,828	393	518	627	805	343	624
District 2	1,151	1,282	119	306	167	297	156	270
Ind., Ill., Ky.	24,560	28,243	4,212	5,518	10,251	16,170	3,619	5,831
Okla., Kans., Mo.	12,087	13,591	973	1,509	7,887	10,069	1,102	1,825
Inland Texas	3,782	4,516	427	475	1,032	1,555	795	1,307
Texas Gulf Coast	17,870	19,232	2,968	4,218	12,443	13,543	5,080	6,267
La. Gulf Coast	7,764	6,980	1,275	2,340	3,621	2,998	2,186	1,845
Ark., La. Inland	2,704	2,798	256	518	861	1,212	140	150
Rocky Mountains	3,865	4,400	349	287	1,948	1,672	810	1,060
District 3	104	136	35	.....	78	68	30	34
District 4	3,761	4,264	314	287	1,870	1,604	780	1,026
California	15,625	14,641	611	345	11,125	7,193	16,607	13,162
Total U.S.	116,769	123,316	19,723	25,140	71,948	82,533	40,750	42,448

Legislative Outlook

Calls for Industry Vigilance

By L. DAN JONES

Assistant General Counsel, Independent Petroleum Association of America

CRUCIAL in its over-all effect —yes. But not of particular significance in the way of legislation directly affecting the oil industry.

That—in brief—might be a summation of the outlook for the Second session of the 82nd Congress.

There perhaps will not be a great deal of legislative action directly pertaining to oil. The indirect effects of the actions of Congress on general matters, however, will be vitally important to the industry. Even without any specific legislation, the industry will feel the impacts of congressional actions taken in furtherance of the defense program. Some elements of our economy—activities which do not come into daily contact with every citizen of the U. S.—might escape with little effect from the over-all activities of Congress. Not so with oil. No industry so widespread throughout our economy, so basically essential to the daily welfare of the American people and the national security, can escape the impacts of the preparedness program. The main activities of this session of Congress will be in pursuit of the defense effort. It is inescapeable that these activities, so far-reaching in scope, will be felt by the oil industry.

The second session of the 82nd Congress will not be a normal one. The tensions of international affairs prevent a course of normalcy. In addition, the fact that this is an election year will have an effect upon the program of Congress. There is a definite attitude in Congress that only the essentials of the defense program should be undertaken this session; that an early adjournment should be the aim. It appears that this attitude most likely will prevail.

The swirl of congressional activities this session will pivot about the budget and appropriations. All else must find a place in the program as best can.

THE PREPAREDNESS program which will be of chief concern to the 82nd Congress is certain to have its impact on the oil industry. The author points out that this session will not be a normal one because of congressional sensitivity to the approaching elections. All the more reason that the industry be alert to any laws that may define the system and atmosphere in which it is to operate. Moreover, this alertness must apply not only to specific oil legislation, but to the general program of Congress.

Among the items that will have priority action are financing the domestic military buildup; foreign aid, both economic and military; and emergency controls.

Work To Be Deferred

Much of the Administration's domestic program, such as the controversial civil rights program, labor law revisions, health program, and enlargement of the social security benefits, probably will be deferred. The Senate Democratic leadership most likely will not risk a tying up of essential appropriations. And some items on the domestic program would certainly do that. This arises because although the Democrats have nominal control of both houses the Administration is not in solid control of either chamber.

In the Senate there are 50 Democrats to 46 Republicans; in the House 233 Democrats, 201 Republicans and 1 Independent Democrat. These statistics, however, do not tell the full story. A study of key votes during the previous session, on both domestic and international issues, shows that a coalition opposed the Administration with a small margin of control of both the Senate and House.

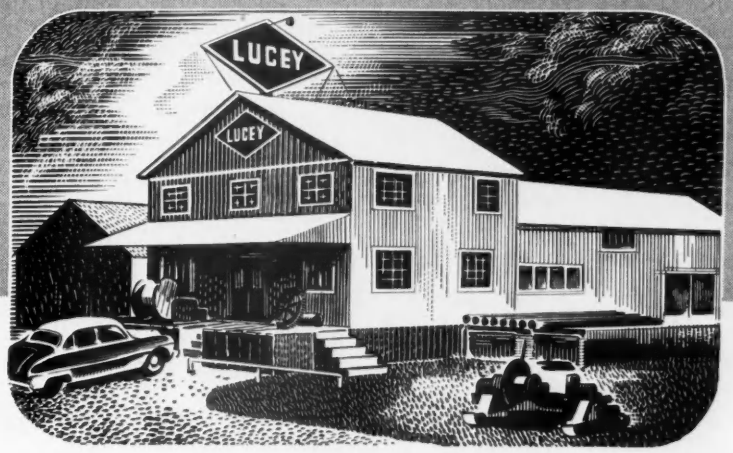
There are a number of matters pertaining to oil specifically which will be before Congress during the session. Just how far any of these items move in the legislative process will depend in large part on the above referred to overriding determinants of the congressional program.

Among specific oil items which likely will receive some attention at least are the following:

TAXES: There appears to exist a very general attitude in Congress that taxes will not be increased this session. Many believe that the present rate is reaching the maximum limit; that to go further would lead head on into the law of diminishing return. Both the chairman of the Senate Finance Committee and the chairman of the House Ways and Means Committee have expressed themselves as opposed to further tax increases unless we become involved in all-out war.

The attitude of Congress on this question seems to be exemplified in a statement in the Report of the Senate Finance Committee on the 1951 Revenue Act. In referring to the Revenue Act of 1950, the Excess Profits Tax Act of 1950 and the Revenue Act of 1951, the Committee said:

> "Never before has so much additional revenue been raised in so short a period of time. Moreover, these three revenue measures have brought the income tax burdens of most corporate and individual taxpayers near the World War II peak and for many such taxpayers the rates imposed under your committee's bill are above the maximum rates imposed during World War II. As a result your Committee has serious doubts as to the feasibility of raising any substantial additional amounts of revenue from income tax sources. This is said although



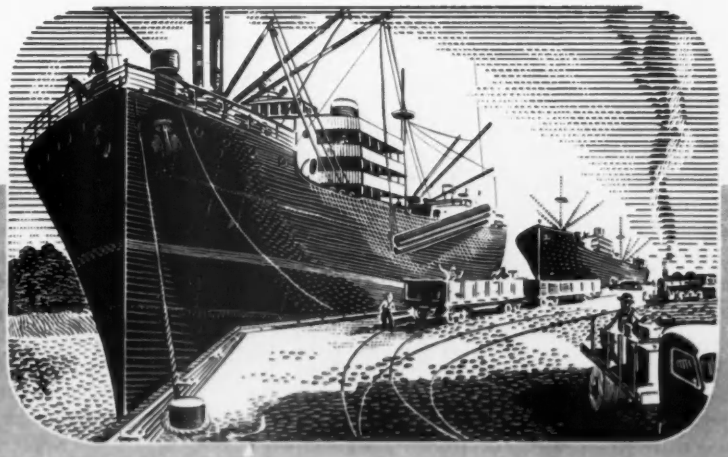
LUCEY is one of the very oldest names in the Supply Industry, and the firm it represents has a worldwide reputation for resourcefulness and dependability.

We have a talent for accomplishing unusual services demanding fluid policy, stability and understanding of our customer's problems that has aided substantially in the emergencies with which the Oil Industry has found itself confronted during the past several years.

LUCEY PRODUCTS CORPORATION

OIL WELL SUPPLIES

TULSA, OKLAHOMA



it is recognized that present expenditure estimates made by the executive departments indicate very substantial additions to federal expenditures next year. In view of this, your committee believes that every effort must be made to reduce expenditures."

This situation does not necessarily mean that the oil industry will have no tax problems this session. In fact, it could mean that the attack, experienced in recent years on the depletion factor and the intangible drilling cost option, could be repeated this year with greater concerted effort.

There have been indications that the Administration would concentrate its tax proposals on the closing of what has been termed the "loopholes" of the tax laws. Fallacious and misrepresentative as it is, the depletion recognition for the oil producer has been placed in this designation by some.

The attacks on depletion made last year, in 1950 and in 1942 were overcome after full investigations and study by committees of Congress. The result has been a strengthening of the depletion provision. There is a better understanding, not only on the part of Congress but that of the public in general, of the risks of finding oil. There is a better understanding that the normal method of tax treatment which permits the recovery of assets in the form of a building or a piece of machinery through depreciation allowances, is unrealistic and impractical when applied to oil. The building, as it is used, merely depreciates and can be restored. The barrel of oil, however, is completely destroyed as it is consumed. Yet both constitute capital assets of the owner—the barrel of oil being different in another respect in that it is part capital and part income.

There is a far better understanding today than in times past that the tax laws must recognize these fundamental differences. Because of this better understanding, there is less likelihood that the depletion factor will be changed.

Aside from depletion another tax matter which, if raised, would be of particular importance to the oil industry is the withholding of taxes on royalties, rents and bonuses. The proposal of last year to withhold on dividends and interest also included royalties, rents and bonuses. There has been some speculation that the administration will renew this proposal during the current session.

The requirement to withhold taxes on royalties, rents and bonuses would create an extreme hardship on the oil industry. The administrative difficulties alone would be especially burdensome. Beyond that, its effect upon the costs of operations in the leasing of oil land could be most disruptive and disturbing of normal practices.

This is a matter the industry must be prepared to meet if it is renewed before this session of the Congress.

CONTROLS: Among the emergency controls affecting oil, those of price ceilings and materials allocations are of first importance to the producing branch. The price of crude and the supply of pipe will continue for the months ahead to be among the oil producers' problems.

Price and materials controls are provided for in the Defense Production Act of 1950 which was extended last year to June 30, 1952. This means that Congress soon will have before it the problem of extending these controls.

The President in his State of the Nation message to the second session of the 82nd Congress said that the Defense Production Act had been weakened and needed repair. Apparently this had reference to, among other things, the so-called Capehart Amendment passed last year. This amendment makes mandatory price ceiling adjustments so as to reflect increased costs occurring after Korea and before July 26, 1951.

At the close of the last session the Administration made a determined effort to repeal the Capehart Amendment. A Bill, S. 2170, to accomplish this was actually passed by the Senate. It did not pass the House. It is still before the House, however, and could be taken up at any time.

New Effort Hinted

The President's message suggested that a renewed effort will be made to repeal the Capehart Amendment. This may be of vital importance to the oil producer. The repeal bill which passed the Senate last year would have excluded "producers" from eligibility for the cost increase relief provided by the Capehart Amendment.

The Office of Price Stabilization vacillated for many months as to whether or not producers were in fact covered by the Capehart Amendment. Finally, in issuing General Overriding Regulation 21 it was announced that Capehart relief would be extended to producers. This announcement, however, was not in the order itself but in an accompanying press release. The language of the order itself shows it was written before the policy decision on producers was made by OPS. As a result the order is impractical and useless as to the oil producing industry.

There seems to have been a determination to delay administrative implementation of the Capehart Amendment. It was passed by Congress last July. In October OPS officials were seeking its repeal. Not until General Overriding Regulation 21, issued December 5, 1951, was administrative procedure provided for making it effective. Even now, since General Overriding Regulation 21 is impractical and unworkable as to crude, the oil producer is without effective means of obtaining Capehart relief.

With respect to essential materials it appears certain that allocation controls will be extended. The administration of these controls inherently involve an administrative choice in allotting scarce materials among various industries which normally compete for the available supply. In such circumstances strong influences may be brought to bear which could endanger a proper balance of the distribution program.

For these reasons emergency control legislation will be important to the oil producing industry.

TIDELANDS: During the past year there have been two significant developments pertaining to the tidelands controversy between the states and the federal government.

First and directly bearing on a settlement of the issue was the action by the House of Representatives in passing by a vote of 265 to 109 the Tidelands Bill (H.R. 4484) which restores to the states the title to lands beneath navigable waters within state boundaries.

Second is the law suit instituted by the federal government commonly referred to as the Fallbrook case.

The bill passed by the House would restore state title to all submerged lands within the seaward limits of the state boundaries. Beyond the state boundary both title and administrative jurisdiction would be in the federal government, but the states would receive 37½ percent of the revenue derived from leases and royalties. The substantial margin of the vote on this bill cannot but be encouraging to the states. This action by the House has strengthened their determination and position.

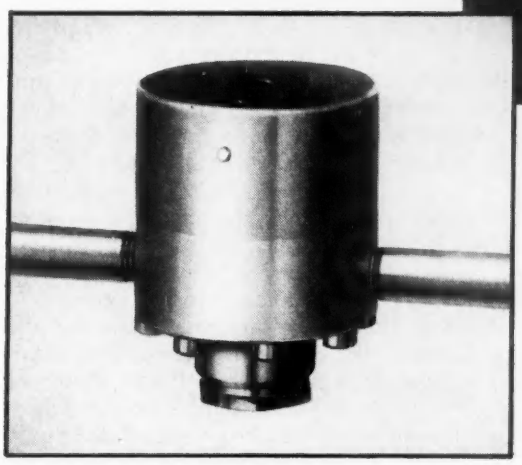
The Fallbrook case involves the water rights of the citizens of the town of Fallbrook, Calif., and surrounding area. The water rights involved are those of the small Santa Margarita River, sometimes in the dry season being no more than a few feet wide and a few inches deep. The

MIGHTY SMALL..

but with a TREMENDOUS CAPACITY

GROVE MITY-MITE

PRESSURE REDUCING REGULATORS



- ENTIRELY SELF-CONTAINED
- SINGLE-SEATED VALVE CONSTRUCTION
- INSTANTANEOUS AUTOMATIC CONTROL
- MAINTAINS CONSTANT DELIVERED PRESSURES
- COMPLETE RANGEABILITY
- EXTREMELY SENSITIVE TO PRESSURE CHANGES

For Initial Pressures up to 3500 pounds; Adjustable Control Range from 5 to 1500 pounds.

Utilizing the proved Grove Powreactor Dome principle, MITY-MITE Reducing Regulators provide a capacity range equal to other regulators ten times their diminutive size. Typical of the Mity-Mite's performance is delivery of more than 15,000 c.f.h. while reducing the pressure from 1000 p.s.i. to 100 p.s.i. Construction is rugged yet compact, measuring but 2¾" x 3¼" and weighing less than 2 pounds. Control is smooth, non-chattering, instantaneous. Shut-off is positive and bubble-tight on dead-end service. Handles temperatures up to 150° F.

Special models can be supplied for pressures up to 5000 p.s.i., for liquid service, and for back pressure regulation. Built-in relief valves incorporated if required.

For air, gas or liquid service in the field or laboratory, the Mity-Mite's performance is unmatched by any other regulator. Wire or write today for full details.

GROVE

The reliability of Grove Valves and Regulators is proved by the thousands of successful installations handling air, gas, oil, water and other fluids. For the solution to your control problems, contact the nearest Grove representative.

MITY-MITE PRESSURE REDUCING REGULATORS

GROVE REGULATOR CO. 85th and HOLLIS STREETS, EMERYVILLE, CALIFORNIA

1901 CALUMET, HOUSTON 6, TEXAS · 233 EAST 69TH ST., NEW YORK 21, N. Y.

DISTRICT OFFICES: Dallas, Corpus Christi, Odessa, Texas — Lafayette, Louisiana — Tulsa, Oklahoma — Los Angeles, California

issues involved, however, go far beyond what might be expected from this simple setting.

The water from the Santa Margarita has for generations been used by the riparian owners. These rights are now being contested and it is being argued by the Department of Justice that the exclusive water rights to this river belong to the federal government because of its ownership of the land on which is located Camp Pendleton, through which the river runs.

The Attorney General of the U. S., in this case alleges that the water from the Santa Margarita belongs to the Camp because of the "paramount" right of the federal government.

This case becomes associated with the tidelands question because it was in the California tidelands decision in 1947 that this theory of "paramount" right of the federal government was first enunciated. The Fallbrook case may at first glance appear local and insignificant in the national picture. But on study, the contrary is revealed.

The Department of Justice is now in the process of serving 14,000 summonses on land owners who heretofore have enjoyed the water rights of the Santa Margarita. In this case, the U. S. Department of Justice has requested the Federal Court to declare all the rights of the U. S. in and to the Santa Margarita River as "paramount" to the rights of the defendants.

If the federal government can have "paramount" authority to take California water, then by the same reasoning and authority it might take anything anywhere.

The resultant concern of the issues raised in the Fallbrook case already has brought about two Congressional investigations, one by a House Judiciary Subcommittee and another by the Irrigation and Reclamation Subcommittee of the House Interior and Insular Affairs Committee.

The Fallbrook Case may bring a wider awakening of the basic issues involved in the tidelands cases establishing the "paramount" theory of federal government superior rights. If so, it is sure to have a direct bearing in the end on the tidelands controversy. In this respect, time operates in favor of the states.

In contrast, however, further delay in settlement of the tidelands issues operates to the detriment of the U. S. It is delaying the development of the vast oil tidelands potential which should be in the process of maximum development to be made available for any emergency.

The Senate Interior and Insular Affairs Committee has never acted on the House-passed bill, H. R. 4484. On January 22, however, the Senate Committee took a long awaited step by approving S. J. Res. 20, which provides a five-year interim solution of the controversy. Of most importance, this interim bill would permit operations to be resumed on the tidelands.

When S. J. Res. 20 reaches the floor of the Senate there may be an effort made to substitute the House-passed Bill (H. R. 4484). Even if this were successful, it would be subject to presidential veto.

In view of these circumstances it appears unlikely that the tidelands issue will be permanently settled this year.

IMPORTS: Imports have not been an active problem for the past 1½ years. It has been obscured by the demands of the preparedness program. The potentials of the problem, however, have become greater. Imports could easily and rapidly become a matter of major concern to the domestic producer.

There have been a number of significant developments during the past year.

- Imports into the U. S. during 1951 averaged about 842,000 barrels daily, approximately 5000 less than the record year of 1950.
- The Iranian production of about 700,000 barrels daily was lost and made up. If and when it is restored to the world market a problem could well be created.
- In Canada, production averaged about 130,000 barrels daily in 1951 as compared with 77,000 in 1950. Moves to solve the transportation problem have progressed. Recently the Canadian Transportation Board in Ottawa authorized the first pipe line out of Alberta running to the West. This is a 24-inch line from Edmonton to Vancouver with an ultimate capacity of 200,000 barrels daily. This is a significant development with respect to the Pacific Northwest market, heretofore being substantially an exclusive outlet for California oil.

Venezuela Pact

Another development on imports is presented by the action of the Venezuelan government in seeking, through a renegotiation of the Venezuela Trade Agreement, to reduce to 5¼ cents, the excise duty on crude and residual from the present rate, which averages about 17 cents per barrel. In a hearing before the U. S. Tariff Commission in October, 1951, the importing companies supported this request for a reduction of the present duty. Final action on the request will provide a significant indication as to the future policy of the Executive Branch of the government on imports.

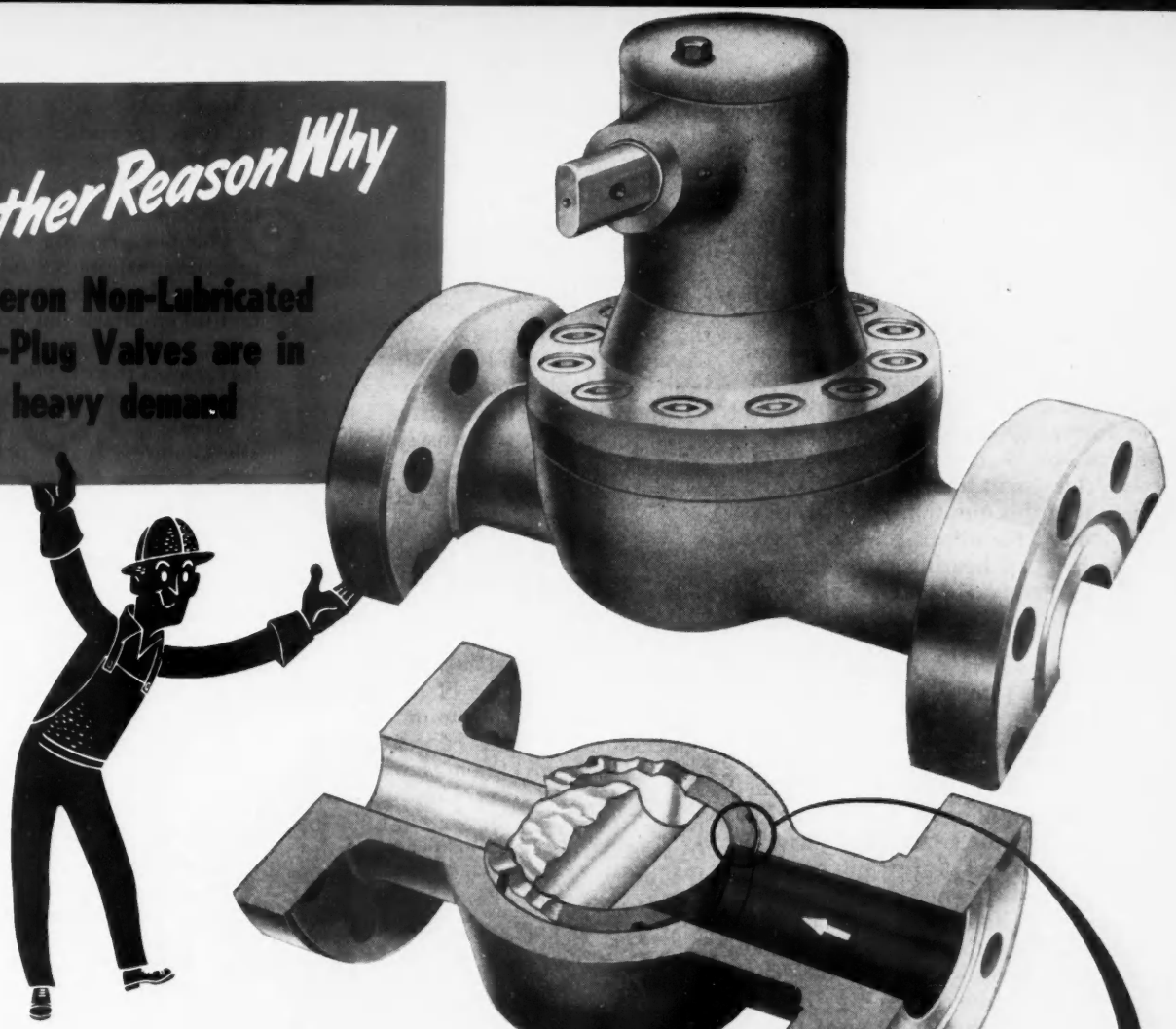
As to import legislation, there are now before Congress two identical bills, introduced early last year by Congressman Boggs of Delaware and Congressman Mitchell of Washington providing in substance for a free exchange of oil as between the U. S. and Canada. The scope of these bills is confined to the two countries. For this reason there have been indications that the State Department opposed these bills on the ground they would constitute discriminatory treatment of oil from countries other than Canada. Action on the bills would provide an opportunity for an expression of Congressional policy on the question of imports.

NATURAL GAS: The controversy as to the efforts of the Federal Power Commission to extend its jurisdiction into the production and gathering of gas is temporarily out of the legislative process and in the hands of the judiciary. The Federal Power Commission's decision in the Phillips Petroleum Company case has been appealed to the courts and very likely may be carried through to the Supreme Court. In the Phillips case, the FPC held that it did not have jurisdiction over the production and gathering of gas. The decision of the five-man Commission was 4 to 1, with Commissioner Buchanan, recently appointed chairman, dissenting. The issue, which has been a long and bitter one at times, would appear to be settled if it were not for the fact that a change in the personnel of the commission could mean a reversal of the Phillips decision. This exemplifies the uncertainties and dangers of relying on administrative rulings rather than legislative mandate. For the industry to be assured, there continues to be a need for a restatement of the original intent of the Congress on this important issue.

There are now pending before Congress several natural gas bills. In the Senate, S. 1000, introduced jointly by Senators Dirksen and Douglas of Illinois, proposes to amend the Natural Gas Act by broadening the right of interstate natural gas pipe lines, after receipt of certificate authorty from the Federal Power Commission, to exercise eminent domain to condemn geological strata for the underground storage of gas. A similar bill, H. R. 3793, has been introduced in the House. The language of these bills as introduced is broad and unrestricted. It was considered by some to permit the condemnation of valuable oil and gas-producing strata. Because of this the bills as originally introduced have

Another Reason Why

Cameron Non-Lubricated Lift-Plug Valves are in heavy demand

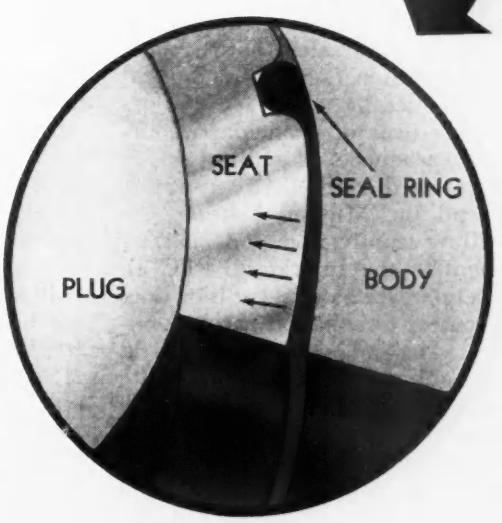


Pressure Forces Improve the Seal...

effects of body distortion eliminated

Body distortion will cause ordinary valves to leak because the action of pressure forces and line strains tend to separate the sealing surfaces. To bridge this separation, a viscous lubricant is usually injected into the valve. However, lubrication to maintain a seal is not required in the Cameron Lift-Plug Valve since pressure forces act to improve rather than to destroy the seal.

Illustrated herewith is a section through a Cameron Life-Plug Valve in the closed position. The plug is firmly wedged into the seat during the final step of the actuator motion and a primary metal-to-metal seal is secured. Then, as shown in the circled enlargement, line pressure (indicated by red) exerts forces on an exterior portion of the seal to press it into even closer sealing contact with the plug.



Cameron

NON-LUBRICATED LIFT-PLUG VALVES

CAMERON IRON WORKS, Inc. P. O. Box 1212 Houston, Texas

Export: 74 Trinity Place, New York, N. Y. Represented in sterling area by: British Oilfield Equipment Co., Ltd., Duke's Court, St. James's, London S.W. 1, England.

been opposed. Limiting language which would protect producing oil and gas strata has been proposed. It is understood that such amendatory proposals have been favorably received.

The unlimited and unrestricted nature of the original bills has also raised an expressed fear from some that the authority for underground storage should be limited as to the quantity of gas that may be stored. No formal proposal has as yet been offered to the committee to accomplish this limitation, but it appears likely that this question will be raised.

To date, these bills have not been the subject of hearing. They remain in the Interstate and Foreign Commerce committees of the Senate and House.

FPC Status

The issue as to FPC jurisdiction over distribution companies is also before Congress. Bills have been introduced proposing to amond the Act so as to exempt from FPC jurisdiction the activities of distribution companies operating wholly within a state. This issue is somewhat parallel with that raised by the efforts of FPC to extend its jurisdiction into the local activity of production and gathering. The fact that these bills were before Congress last year without progressing far in the legislative process suggests that in view of the situation confronting the Congress this session they will not be finally acted upon before Congress adjourns.

Also before the Congress is a bill proposing to amend the Natural Gas Act so as to confer upon the Federal Power Commission the authority to prescribe rules and regulations for the promotion of safety with respect to transportation facilities of natural gas companies.

Another issue of particular importance to producers of natural gas is that presented by S. 1346, proposing to amend the Mineral Leasing Act of 1920 by transferring from the Department of the Interior to FPC all jurisdiction over natural gas pipe lines with respect to common carrier obligations. This bill would affect field gathering lines as well as interstate transmission lines. At the hearing on this bill, the Federal Power Commission proposed a substitute measure which, among other things, would amend the jurisdictional section of the Natural Gas Act so as to provide that interstate natural gas pipe lines which obtained a right-of-way across public lands shall serve as a common carrier provided that "the Commission may in its discretion find that such common carrier has satisfied its common carrier obligation by agreeing to purchase natural gas from the shipper at a reasonable price." (Underscoring supplied.)

The underscored language renews the controversy as to FPC jurisdiction over the production and gathering of gas. This bill remains before the Senate Interstate and Foreign Commerce Committee. There have been no indications as yet as to whether or not this matter will be urged for a determination during this session.

Outside the legislative activity, but a matter which may ultimately require some action by Congress, is that involving the importation of natural gas.

The first application for the importation of natural gas into the U. S. is now before the Federal Power Commission for determination. The final decision may be expected at any time. This application was made by the Montana Power Company seeking authority to import natural gas from Alberta, Canada, into Montana for use by Anaconda Copper Company in certain specified defense plants. The application is limited in the amount of gas to be imported and to a five-year term.

In addition to the Montana application, however, there are now pending before the Conservation Board of Alberta five applications for permits to export gas from that province. Three of these applications involve proposals of large long-distance pipe lines carrying gas to the Northwest Pacific area. Two of the applications propose eastward movement of gas.

These developments as to gas imports indicate that large-scale imports of natural gas may present policy questions in the not too distant future. This may raise problems requiring legislative attention. It poses the question as to whether or not the importation of gas presents issues which call for congressional determinations as to policy.

PUBLIC LANDS: There is now pending before the House Committee on Interior and Insular Affairs a Bill, H. R. 4752, introduced by Congressman Regan of Texas which would amend the Mineral Leasing Act. This bill proposes to repeal the provision in the act providing that in the leasing of public lands not within a known geological structure of a producing oil or gas well, the rentals for the second and third years shall be waived unless a valuable deposit of oil or gas be sooner discovered. This bill was the subject of hearing last year before the Subcommittee on Mines and Mining. Thereafter the bill was favorably reported by the subcommittee to the full committee. The full committee has not as yet taken action on it.

The bill presents a basic issue. Its primary purpose is aimed at increased revenue. In the leasing act the fundamental emphasis has been on development, not revenue. The bill, therefore, raises the question of shifting the basic purpose of the public land laws.

Another federal land matter before the Congress is one pertaining to acquired lands. Early in the session last year Congressman Williams of Mississippi introduced a bill providing for the leasing of federally-owned acquired lands on a competitive basis rather than under the Mineral Leasing Act applicable to the public lands. The bill was not the subject of hearing or committee action during the first session.

Conclusion

The oil industry continues a rapid growth in its position of essentiality to the national life. As it does so the industry's primary responsibility—an assured supply of oil at all times—becomes of increasing importance to the nation's expanding industrial economy and the military security.

There is or should be a compensating factor. As the burden of the primary responsibility increases there should be an accompanying better understanding on the part of officials of government as well as the general public. There are some signs that this is so. As an indication, recent press reports have said that the National Security Council, the top military policy-making agency of the federal government, has moved oil up in its position among essential activity.

This bettering of understanding should be helpful in meting the problems which may confront the industry—legislative and administrative. It should mean that the industry's task of overcoming unfounded attacks on its tax structure will be lessened; that the problems of allocations of essential steel and a realistic application of the price control laws can be expected.

For the petroleum industry to meet its responsibility its greatest task is to make sure that its ability to do so is not impaired. It must be alert to the laws that define the system and atmosphere in which it is to operate. This requires an alertness not only to specific oil legislation but also as to the general program of Congress.

Oil's record of performance ably equips it to meet, forthrightly and with assurance, the problems which may arise in the Congress during this session.

Baash-Ross News

BAASH-ROSS TOOL CO[illegible] ANGELES • HOUSTON • OKLAHOMA CITY • NEW YORK

OUR 32nd YEAR

It's BAASH-RO[illegible] .. FOR EVERYTHING IN SQUARE KELLYS.

All Sizes—All Designs—All Lengths

PLUS the Most Advanced Construction and Metallurgical Features!

FOR YEARS Baash-Ross has led in the development of a superior line of square Kellys to meet the increasingly rigid requirements of modern drilling operations. And best of all, these top-quality Kellys are available in a range of sizes and designs to meet every operator's need ... with or without stop shoulders, elevator spaces, etc. ... and in all lengths.

In fact, Baash-Ross provides everything in square* Kellys!

They have Everything in Performance Features!

● Baash-Ross Square Kellys are forged end-to-end from one solid piece of restricted analysis, fine-grained alloy steel, with each heat of steel individually checked for quality by separate test specimens.

● After forging and before heat treating, the dimensional accuracy of the forged square section is checked by an API Kelly Sleeve Gage which must pass freely over the entire length of the square to check maximum allowable tolerances across flats and across corners. Also, accurate caliper measurements are taken to make sure no portion of the driving section is undersize!

● Next, a series of heat-treating operations performed over the *entire length* of the Kelly in *one* operation, develop the metallurgical properties of the steel to provide the *best balance* of shock-resisting toughness and wear-resisting hardness.

● Additional heat-treatments harden the threaded ends for maximum life and service.

● All residual forging stresses are relieved by these heat-treating processes, thus eliminating the most prevalent cause of bending and deformation.

● The Kellys are then carefully bored by precision drilling machines so that the bore is precisely centered end-to-end, then double-checked by highly-accurate survey devices. For products with bores 2¼" diameter or larger, wall thickness of the Kelly *must not* vary more than *one-sixteenth* inch for each 10 ft. of product length, or fraction thereof.

● The Kelly itself is also accurately surveyed for straightness and *must* be straight within *one-eighth* inch when measured at *any* point over its entire length.

● The alignment of the projected axis of each threaded end, when checked with the precise Baash-Ross Alignoscope, *must* be within *one-eighth* inch of the longitudinal axis of the Kelly for each 10 ft. of Kelly length, or fraction thereof.

● In addition, threads *must* pass, not only all API specifications, but also unusually rigid Baash-Ross specifications on thread form, taper, lead, finish, etc.

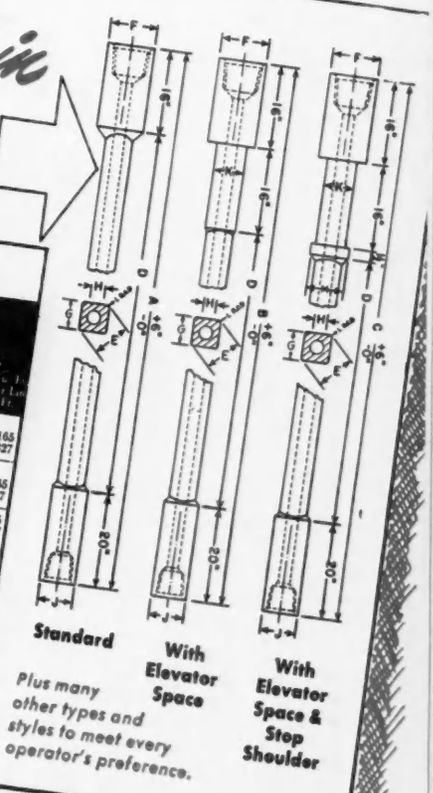
The above highlight only a few of the many controls maintained by Baash-Ross to insure absolute straightness, long-life and maximum all-around performance from every Baash-Ross Kelly!

They are Available in .. All Sizes .. All Designs

Baash-Ross "Trubore" Forged Upset Square Kellys

Nominal Size In.	LENGTHS: Overall A Ft.	Overall B Ft.	Overall C Ft.	Working Length D Ft.	Top Upset: Joint Size A.P.I. Left Hand In.	Top Upset: O.D. E In.	Bottom Upset: Joint Size A.P.I. Right Hand In.	Bottom Upset: O.D. J In.	Bore: I.D. H In.	Across Corners E In.	Across Flats F In.	Elevator Space: O.D. K In.	Elevator Space: Corner Radius L In.	Stop Shoulder O.D. M In.	Approx. Wt. per Lin. Ft.
5¼	35 38 40	36–4 39–4 41–4	36–6 39–6 41–6	32 35 37	4½ Reg. 6⅝ Reg.	5½* 7⅝	2⅝ Reg 2⅝ I.F.	3¼ 5⅝	1¹⁄₁₆ 1¼	5⅝₁₆	7⅛	2¹³⁄₁₆	6⅛₀	3⅝	*.165 .327
6	35 38 40	36–4 39–4 41–4	36–6 39–6 41–6	32 35 37	4½ Reg. 6⅝ Reg.	5½* 7⅝	2⅞ Reg 2⅞ I.F.	3¾ 4⅝	1¼ 1⅝	6¼₁₆	8	2¹⁵⁄₁₆	⅝	4⅛	*.165 .327
5¼	35 38 40	36–4 39–4 41–4	36–6 39–6 41–6	32 35 37	4½ Reg. 6⅝ Reg.	5½* 7⅝	3½ Reg. 3½ F.H. 3½ I.F.	4⅛ 4⅝ 4⅝	1½ 2⅛ 2⅛	6¹³⁄₁₆	8½	3¹⁵⁄₃₂	½	4⅝	*.165 .327
6	35 38 40 44	36–4 39–4 41–4 55–4	36–6 39–6 41–6 55–6	32 35 37 41	4½ Reg. 6⅝ Reg.	5½* 7⅝	4½ Reg. 4½ F.H. 4½ I.F.	5½* 5⅝ 6⅛	2¼ 2⅝ 2⅝	8¹⁵⁄₁₆	4⅝	4¹⁹⁄₃₂	½	5⅝	*.165 .327
6	38 40 44	39–4 41–4 55–4	39–6 41–6 55–6	35 37 41	6⅝ Reg.	7⅝	5½ Reg. 5½ F.H. 5½ I.F.	6⅝ 7 7⅛	2⅝ 3⅛ 3⅛	6²³⁄₃₂	8⅛	5⅝	⅝	7	.327
6	38 40 44	39–4 41–4 55–4	39–6 41–6 55–6	35 37 41	6⅝ Reg.	7⅝	6⅝ Reg. 6⅝ F.H.	7⅝ 8	3½ 3½	7⅛	6	6¾	⅝	8	.327

Figure tolerances for Alternate 5¼ inches O.D. — 190 cu. ft. per lineal ft
† Volume based on largest diameter of kelly



Plus many other types and styles to meet every operator's preference.

The Baash-Ross lines of Hexagon and Octagon Kellys are equally complete. Write for data.

BAASH-ROSS KELLYS ARE AVAILABLE THROUGH LEADING SUPPLY STORES!

Oil-Using Units

Have Sharp Growth

A VERY sharp growth in the principal petroleum consuming units has occurred in the U. S. since the war. It is significant to the oil and gas industry that the number of consuming units in use is growing at a much faster rate than before the war, and that the rate of growth in both 1951 and 1950 was especially large. This indicates that the mechanization of this country is continuing at an accelerated pace, which presages further growth in petroleum consumption.

The number of motor vehicles (passenger cars, trucks and buses) in use in the U. S. reached an all-time high of about 52 million at the end of 1951. This was nearly 3 million greater than a year previous, 7½ million larger than two years ago and 21 million bigger than at the end of the war.

Although much of this postwar growth is attributable to pentup wartime demand, there is no indication that the number of motor vehicles in use has reached its peak.

Likewise, the number of farm tractors in use continues to increase. The 4,400,000 tractors at the end of 1951 was almost double the 1945 quantity.

The most phenomenal growth in recent years has occurred in railroad diesel locomotives. Aside from terminal switch engines, not included in figures presented here, approximately 16,500 diesel mainline locomotives were in operation at the end of 1951, or more than four times the 3816 operating at the end of 1945.

Diesels Big Consumers

Because of their year-around use and large consumption, each diesel locomotive uses an average of about 5000 barrels of distillate fuel oil per year. In contrast, during normal winters the average consumption per home oil burner is less than 50 barrels and the average use per automobile is only 20 barrels.

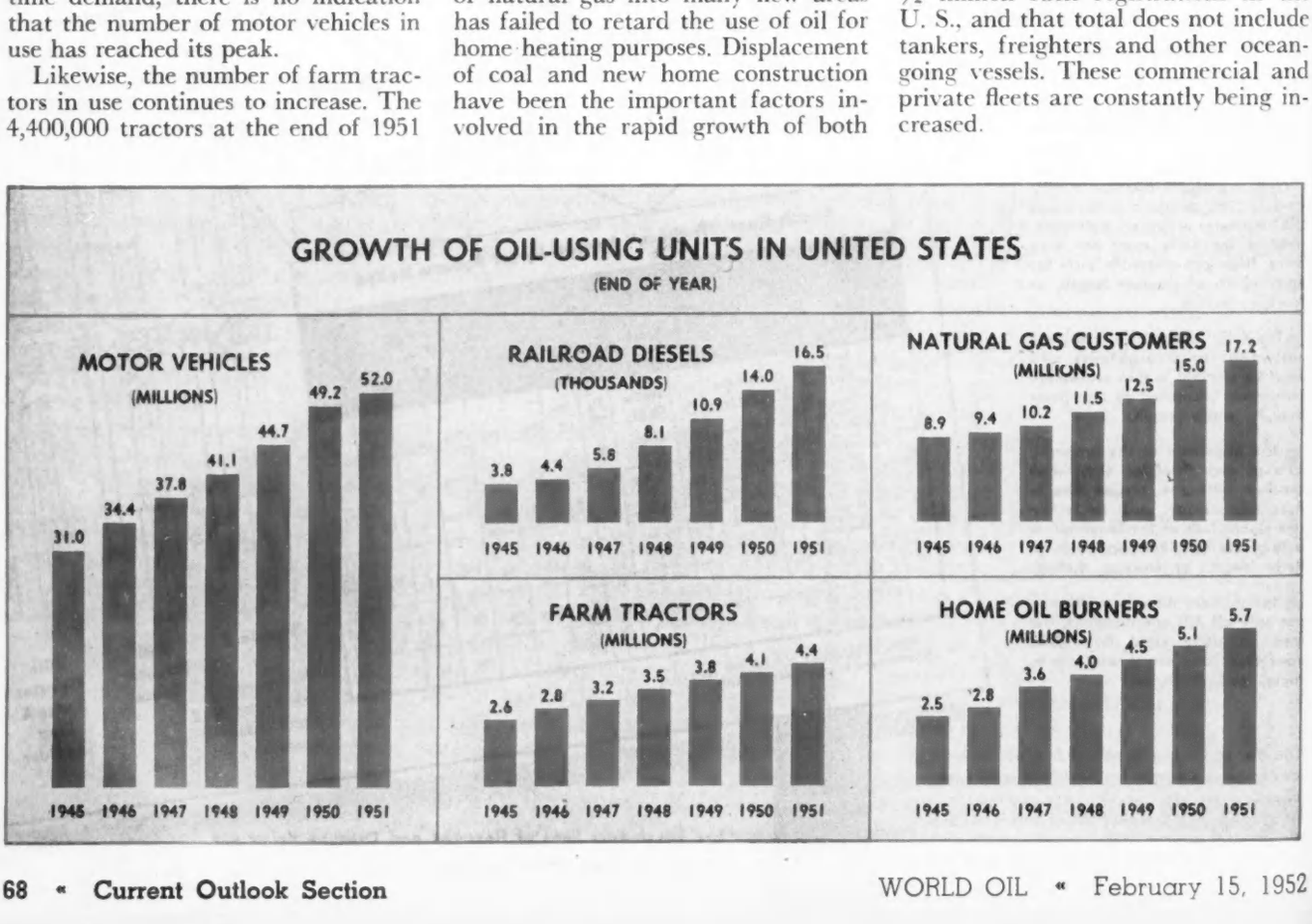
There has been an amazing increase in the number of domestic or home oil burners installed. So far, contrary to early expectations, the distribution of natural gas into many new areas has failed to retard the use of oil for home heating purposes. Displacement of coal and new home construction have been the important factors involved in the rapid growth of both oil and gas in the home heating field.

The number of domestic oil burners rose 600,000 during the past year. The number in operation at the end of 1951 was 5,700,000, double the quantity installed at the end of 1946.

At the same time, there has been an amazing growth in the number of natural gas customers. At the end of 1951, there were 17,167,000 natural gas consuming customers, compared with 15,030,000 a year ago. The number of gas customers now is almost twice the quantity at the end of 1945.

Not included in the charts below are numerous other oil-consuming units or vehicles that require sizeable amounts of petroleum products in their operation. Aircraft, both commercial and private, are steadily increasing in numbers.

Motor boats are another source of considerable demand for both diesel fuel and gasoline. There are almost ½ million such registrations in the U. S., and that total does not include tankers, freighters and other ocean-going vessels. These commercial and private fleets are constantly being increased.



Steel for Oil

Prospects Brighter

By ROBERT E. SPANN, WORLD OIL Staff

THE outlook for increases in steel rations to the petroleum industry is growing brighter with the steady rise in over-all producing capacity of mills and the indication that military consumption of steel will be spread over a longer period.

Barring any additional emergency military requirements for an increased rate of defense buildup, allocations of steel for petroleum operations are believed to have reached the low point in the first quarter of this year and a steady improvement in steel availability can be expected in the latter part of the year and in 1953. There are no indications that over-all allocations to the industry will be increased this year, but if present plans of Petroleum Administration for Defense officials materialize, larger allotments to some branches of the oil and gas industry can be looked for later this year without corresponding reductions in supplies to other industry divisions.

Allocations of steel so far under the Controlled Materials Plan, which became fully operative starting with the fourth quarter of 1951, have most restricted the expansion programs of the transportation and refining branches of the industry. While the total availability of carbon steel plate urgently needed by both of these divisions will continue tight into the foreseeable future, enough improvement in supply is expected to permit pipe line and refinery capacity expansion programs to be increased some to catch up with the additions that have been made in crude production capacity during 1951 and the latter part of 1950.

With total petroleum demand on the U. S. expected to average 7,841,000 barrels daily during 1952, an increase of 5.4 percent over last year, the most optimistic forecasters estimate that the availability of materials will permit the petroleum industry to expand to keep pace with demand but with no opportunity, however, to build reserve capacity above actual

SUFFICIENT IMPROVEMENT is expected in the steel supply to allow pipe line and refinery programs to partly catch up with the expansion in crude production capacity. This would be accomplished, however, without an over-all allocations increase. With total petroleum demand in the U. S. expected to increase 5.4 percent over last year, some forecasters believe steel supplies will just enable the industry to meet the new needs but will not permit the building of a reserve capacity.

TABLE 1

Petroleum Industry Steel Allocations Under Controlled Materials Plan
(TONS)

	1951		1952	
	Third Quarter	Fourth Quarter	First Quarter	Second Quarter
TOTAL, ALL STEEL	1,808,912	1,806,500	1,708,700	1,709,500
Domestic Operations	1,676,622	1,721,500	1,658,747	1,642,500
Foreign (including Canada)	132,290	85,000	80,000	67,000
Carbon Steel	1,606,200	1,670,000	1,595,000	1,602,000
Alloy and Stainless Steel	202,712	134,500	113,700	107,500
Division by Principal Industry Use:				
Oil Country Tubular Goods	468,694	415,700	440,000	450,000
Plate (Line Pipe and Tanks)	890,000	625,000	585,000	565,000
Oil and Gas Producing Total	503,975	477,376	487,353	530,886
Carbon	n.a.	413,400	448,950	492,779
Alloy	n.a.	63,975	38,400	38,100
Stainless	n.a.	1	3	7
Natural Gas Prod. and Proc., Total	107,844	97,800	47,954	61,143
Carbon	n.a.	97,400	47,737	61,006
Alloy	n.a.	400	50	122
Stainless	n.a.	.....	167	15
Gas Transmission and Distribution, Total	557,000	491,301	346,277	337,315
Carbon	n.a.	490,101	343,800	335,306
Alloy	n.a.	1,200	2,475	1,984
Stainless	n.a.	.....	2	25
Oil Transportation Total	367,593	292,208	433,979	423,445
Carbon	n.a.	291,800	433,950	423,105
Alloy	n.a.	400	25	295
Stainless	n.a.	8	4	45
Refining Total	106,400	166,800	125,200	158,472
Carbon	n.a.	162,000	121,050	149,575
Alloy	n.a.	2,800	2,075	7,415
Stainless	n.a.	2,000	2,075	1,482
Marketing Total	6,000	5,500	2,150	3,850
Carbon	n.a.	5,500	2,150	3,849
Alloy	n.a.	.....	.....	.....
Stainless	n.a.	.....	.....	1
Oil Field Machinery and Equipment Total	180,100	210,000	198,075	180,009
Carbon	n.a.	147,250	132,150	122,000
Alloy	n.a.	62,000	65,000	57,084
Stainless	n.a.	750	295	925
Maintenance, Repair and Operating Total	b	75,515	45,025	b
Carbon		72,549	42,863	
Alloy		1,725	1,975	
Stainless		1,241	187	
Reserve Steel Hold by PAD Total (c)	.....	.....	20,734	14,380
Carbon			20,350	14,380
Alloy			.....	.....
Stainless			384	.....

Notes: n.a. Complete breakdown not available.
b Not listed separately but included in total for industry divisions.
c Not established in the third quarter, established but later allocated in fourth. To be allocated in first and second.

needs requested by the military. For the refining branch a sharp increase in steel allocations is considered essential if the industry is to have refining capacity by the end of this year to keep up with the presently indicated demand.

Total allocations of steel to the industry in the first and second quarters of this year (see Table I) are lower than granted in the final two quarters of 1951, but PAD anticipates petroleum operators this year will receive a higher percentage of the allocation than was experienced last year.

The second quarter volume of steel to be made available for oil and gas operations will be slightly larger than was granted the industry for the current three-month period, but the allotment for both quarters of this year is far below the original plans developed by PAD. On an over-all basis, allocations of steel to the petroleum industry for the first six months of this year will support a 1952 drilling program of 43,900 wells. Construction of the less urgent gas transmission lines and some of the less essential petroleum pipe line and storage projects will have to be deferred.

Steel availability for the principal branches of the industry for 1952 appears as follows:

Production: Total steel allocated for oil and gas production operations for the first six months amounts to 1,018,239 tons, compared with 981,351 tons in the last six months of 1951. With its 1951 allocations from PAD, plus imported steel and oil country tubular goods used from inventories, the industry completed a record of 44,826 new domestic wells. While the higher allocation for the first two quarters of 1952 would indicate at least as many wells can be drilled this year, the strict Controlled Materials Plan covers steel used from inventories. Also, conversion tubular material, which gave operators extra steel in 1951, must now be counted against PAD allotments. While the present program is designed to permit completion of 43,900 new wells this year, industry sources estimate that based on present availability conservative use of allocated steel could result in a larger number of completions.

Order Your Copy of 1951 World Oil Index

The complete editorial index covering all issues of WORLD OIL published during 1951 has been prepared and is bound separately in convenient pamphlet form. It will be sent free to all subscribers who write requesting copies.

Orders should be addressed immediately to the Circulation Department, Box 2608, Houston 1, Texas, as quantities are limited.

Oil Pipe Lines: Allotments of steel for crude and refined product pipe lines have been boosted to 857,416 tons in the first half of 1952 from 639,801 tons in the last six months of last year. A substantial volume of this could not be delivered due to shortages of steel plate needed for large diameter line pipe. Most all essential presently planned projects approved by PAD will be completed on schedule based on current volume of steel for the oil transportation branch.

Natural Gas Lines: Steel allocations have been reduced sharply from 1,048,301 tons in the final half of 1951 to 683,592 tons for the first half of 1952. Natural gas transmission projects were given priority last year so that essential lines to the East and Midwest could be ready for operation in the winter months. Due to the overall plate shortage and the continued need for large supplies of line pipe for crude and products lines, no substantial increase in plate allocations for gas lines can be expected this year, though some improvement is looked for possibly in the final months of 1952 or by early 1953.

Refining: Additions to refining capacity last year totaled 266,000 barrels daily, or less than the expansion in demand, with the result that reserve capacity of 400,000 barrels daily that had existed at the start of the year was depleted. Allocations of steel for the first half of this year to the refining branch have been increased slightly over the last half of 1951 to a total of 283,670 tons. Such an allocation is geared for a 1952 refinery expansion program of 330,000 barrels daily, some of which would be required to replace existing plants.

Recognizing the extremely tight refinery picture, PAD now is seeking approval of an increased refinery expansion program from Defense Production Administration to allocate enough steel for an annual construction of 475,000 barrels daily in new refining capacity. The earliest such an expanded program could be commenced would be starting with the third quarter of this year, and since one of the most needed steel items for refinery capacity additions is carbon steel plate, there are some doubts if materials will be available by July to permit an enlarged program without reducing allocations of plate to petroleum and natural gas pipe line projects. Industry leaders say that such an expanded program of refinery expansion could be accomplished if materials could be made available.

TABLE 2

Petroleum Industry Copper and Aluminum Allocations Under Controlled Materials Plan

(Figures in Pounds)

	1951		1952	
	Third Quarter	Fourth Quarter	First Quarter	Second Quarter
INDUSTRY TOTAL:				
Copper	10,100,000*	8,500,000	8,800,000	7,775,000
Aluminum	600,000*	785,000	1,250,000	1,240,000
Oil and Gas Producing:				
Copper	.....	260,500	257,000	530,886
Aluminum	.....	10,000	180,000	132,000
Natural Gas Producing and Processing:				
Copper	.....	592,000	513,000	584,000
Aluminum	.....	2,000	22,750	44,000
Gas Transmission and Distribution:				
Copper	.....	321,000	327,000	299,000
Aluminum	.....	2,000	74,000	60,000
Oil Transportation:				
Copper	.....	516,500	534,500	586,000
Aluminum	.....	8,000	78,000	71,000
Refining:				
Copper	.....	1,280,000	1,300,000	3,852,000
Aluminum	.....	159,000	157,000	209,000
Marketing:				
Copper	.....	10,000	14,000	34,000
Aluminum	.....	.....	1,800	4,000
Oil Field Machinery and Equipment:				
Copper	.....	2,365,000	2,459,000	2,150,000
Aluminum	.....	450,000	600,000	720,000
Maintenance, Repair and Operating:				
Copper	.....	2,840,000	3,180,500	†
Aluminum	.....	112,000	56,450	†
Reserve Held by PAD for Distribution:				
Copper	.....	315,000	15,000	.....
Aluminum	.....	51,000	80,000	.....

* Breakdown by divisions not available. † Not separated but included in division totals.

Exploration Record

20 Percent Above Previous High

By CECIL W. SMITH, WORLD OIL Staff

NEVER in the industry's history have as many exploratory tests been drilled in a single year as were completed during 1951. It was the first year that wells of this type totaled as many as 10,000 but 1951 topped that mark with plenty to spare. A total of 10,793 exploratory tests were finaled to top by 20 percent the previous high of 8997 ventures undertaken during 1950.

If the year's efforts found greater quantities of oil and gas than did previous years' drilling, it was the result of the sheer number of tests drilled, because proportionately fewer wells were finaled as commercial producers. Actually, the past year's exploration failed to maintain the success ratio of the immediate preceding years and percentagewise showed the lowest record since the early war years.

However, in actual numbers the year's exploratory efforts paid off with the greatest degree of success ever attained. It was in the ratio of producer-to-dry hole in which the program fell short. A total of 1956 tests were completed as commercial successes in 1951 for a score of 18.1 percent of the total drilled. A year earlier, 1727 producers accounted for 19.2 percent of all tests. In 1949, about one out of five, or 20.6 percent, found the pay, and in 1948 a little lower 19.7 percent was recorded.

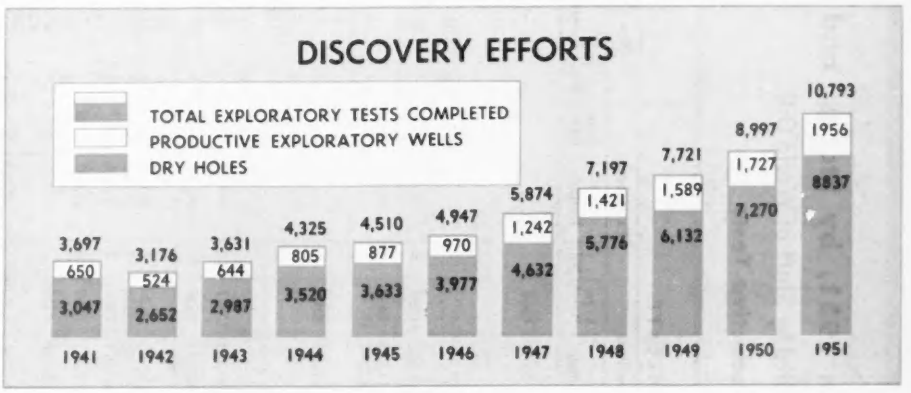
New oil pools credited to the 1951 exploratory program totaled 1341, while the previous high for a single year had been 1119 discovered a year earlier. The year's finds consisted of 1001 new oil fields and 340 new oil horizons in established fields. It was the first year in which as many as 1000 new oil fields were discovered.

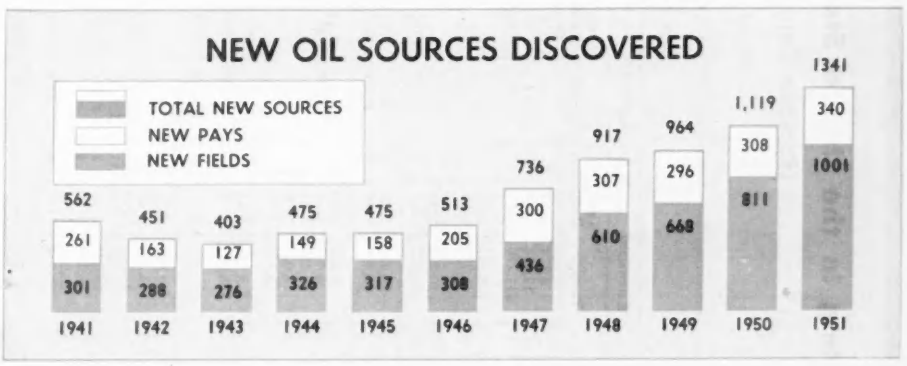
Natural gas discoveries showed an even greater percentage increase over the last year's record than did new oil pools. Dry natural gas finds totaled 226, of which 177 were new fields and 49 were new pay strata. In 1950 gas discoveries had totaled 172.

There was little difference in the number of gas-distillate pools opened in the two years; however, the past year held a slight edge. Eighty-seven distillate pools were discovered—60 new fields and 27 new pays—while 85 were recorded for 1950.

Included in the exploratory classification are outposts and extensions. These included 236 major extensions to oil fields, 46 gas field extensions, and 20 stepouts at distillate fields. This outside drilling resulted in 353 dry outpost tests. To be included in this category, a stepout must be at least one-half mile from nearest production.

When new pay horizon and extension tests are removed from the exploratory well totals only strict wildcat wells remain, and in this classi-





YEAR	Total New Oil, Gas and Distillate Sources Found			New Oil Sources Found			New Gas Sources Found			New Distillate Sources Found		
	Total	New Fields	New Pays	Total	New Fields	New Pays	Total	New Fields	New Pays	Total	New Fields	New Pays
1937	376	239	137	322	203	119	48	33	15	6	3	3
1938	423	264	159	373	229	144	42	31	11	8	4	4
1939	473	258	215	414	224	190	55	33	22	4	1	3
1940	492	309	183	428	261	167	62	46	16	2	2	0
1941	650	362	288	562	301	261	83	58	25	5	3	2
1942	523	348	175	451	288	163	57	47	10	15	13	2
1943	499	347	152	403	276	127	72	56	16	24	15	9
1944	633	460	173	475	326	149	117	102	15	41	32	9
1945	647	451	187	475	317	158	128	113	15	44	30	14
1946	688	412	276	513	308	205	104	75	29	71	29	42
1947	979	576	403	736	436	300	145	96	49	98	44	54
1948	1192	792	400	917	610	307	160	112	48	115	70	45
1949	1264	867	397	964	668	296	179	130	49	121	69	52
1950	1376	1015	361	1119	811	308	172	137	35	85	67	18
1951	1654	1238	416	1341	1001	340	226	177	49	87	60	27

Results of Exploratory Drilling in the United States in 1951, by States, and Comparison with Earlier Years

(Based on Data Compiled by Staff of World Oil)

Part 1: Productive Tests

STATE or DISTRICT	OIL									DISTILLATE									GAS									TOTAL PRODUCTIVE		
	New Fields			New Pays			Extensions			New Fields			New Pays			Extensions			New Fields			New Pays			Extensions					
	No.	Footage	Avge. Depth	No.	Footage	Avge. Depth	No.	Footage	Avge. Depth	No.	Footage	Avge. Depth	No.	Footage	Avge. Depth	No.	Footage	Avge. Depth	No.	Footage	Avge. Depth	No.	Footage	Avge. Depth	No.	Footage	Avge. Depth	No.	Footage	Avge. Depth
Alabama	..	.....	....	1	7,884	7884	2	9,374	4687	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	3	17,258	5752
Arkansas	6	25,994	4332	11	58,064	5278	3	12,890	4296	..	.....	....	1	6,359	6359	..	.....	....	1	2,015	2015	..	.....	....	..	.....	....	22	105,322	4787
California	30	150,600	5020	30	154,364	5145	18	114,796	6377	..	.....	....	..	.....	....	..	.....	....	2	6,374	3187	1	4,893	4893	4	17,068	4267	85	448,095	5271
Colorado	11	62,955	7541	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	5	24,960	4992	1	7,348	7348	..	.....	....	17	95,263	5603
Illinois	38	104,952	2761	21	59,499	2833	47	135,011	2872	..	.....	....	..	.....	....	..	.....	....	1	555	555	2	1,807	903	..	.....	....	109	301,824	2769
Indiana	37	67,398	1821	12	25,652	2137	4	9,710	2427	..	.....	....	..	.....	....	..	.....	....	..	.....	....	1	1,875	1875	..	.....	....	54	104,635	1937
Kansas	148	538,140	3636	24	90,837	3784	..	.....	....	..	.....	....	..	.....	....	..	.....	....	9	43,140	4793	..	.....	....	..	.....	....	181	672,117	3713
Kentucky	19	37,988	1999	8	18,256	2282	9	20,232	2248	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	36	76,476	2124
Louisiana	34	271,029	7971	17	178,400	10494	12	96,637	8053	8	83,614	10451	6	61,854	10309	2	15,390	7695	4	50,866	12716	6	39,412	6568	2	9,456	4728	91	806,658	8864
North Louisiana	19	110,005	5789	4	25,976	6494	6	30,277	5046	2	13,728	6864	2	18,856	9482	2	15,390	7695	..	.....	....	6	39,412	6568	2	9,456	4728	43	263,100	6118
South Louisiana	15	161,024	10734	13	152,424	11724	6	66,360	11060	6	69,886	11647	4	42,998	10749	..	.....	....	4	50,866	12716	..	.....	....	..	.....	....	48	543,558	11324
Michigan	12	35,592	2966	1	1,746	1746	1	4,245	4245	..	.....	....	..	.....	....	..	.....	....	4	7,795	1948	1	3,493	3493	..	.....	....	19	52,871	2782
Mississippi	13	100,499	7730	5	41,459	8291	1	5,670	5670	2	19,194	9597	2	13,604	6802	..	.....	....	1	6,516	6516	..	.....	....	..	.....	....	24	186,942	7789
Montana	4	27,348	6846	..	.....	....	4	10,934	2733	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	8	38,282	4785
Nebraska	12	65,549	5462	1	4,690	4690	3	18,028	6009	..	.....	....	..	.....	....	..	.....	....	1	3,322	3322	..	.....	....	6	20,382	3397	23	111,971	4868
New Mexico	19	158,517	8343	7	48,278	6896	3	35,135	11711	..	.....	....	..	.....	....	..	.....	....	10	44,599	4459	1	2,206	2206	2	13,531	6765	42	302,266	7196
North Dakota	1	11,955	11955	1	11,955	11955	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	2	23,910	11955
Ohio	..	.....	....	..	.....	....	1	3,146	3146	..	.....	....	..	.....	....	..	.....	....	2	7,808	3904	..	.....	....	4	13,713	3428	7	24,667	3523
Oklahoma	89	424,784	4772	26	125,342	4820	34	163,042	4795	4	38,003	9500	2	23,354	11677	2	12,682	6341	12	65,054	5421	1	4,071	4071	2	8,261	4130	172	864,593	5026
Pennsylvania	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	1	8,330	8330	..	.....	....	..	.....	....	1	8,330	8330
Texas	512	2,624,044	5125	164	1,027,134	6263	85	504,061	5930	46	409,180	8895	16	126,082	7880	16	114,764	7172	118	670,795	5684	33	192,832	5843	26	140,927	5420	1016	5,809,819	5718
Dist. 1: S. Central	23	84,743	3684	4	11,707	2926	8	21,916	2739	..	.....	....	..	.....	....	..	.....	....	5	38,680	7736	1	3,450	3450	1	5,265	5265	41	165,761	4042
Dist. 2: Middle Gulf	14	96,374	6883	22	147,625	6710	6	43,110	7185	14	111,831	7987	3	24,392	8130	6	45,005	7500	18	87,609	4867	12	61,413	5117	9	52,889	5876	104	670,248	6444
Dist. 3: Upper Gulf	24	207,553	8648	34	246,265	7243	5	43,352	8670	11	116,916	10628	2	22,700	11350	2	17,315	8657	28	217,282	7760	4	26,576	6644	2	8,562	4281	112	906,521	8093
Dist. 4: L. Gulf-SW	32	196,405	6137	37	260,499	7040	8	52,320	6540	11	102,766	9342	8	59,977	7497	2	16,514	8257	23	138,537	6023	10	73,572	7357	9	52,878	5875	140	953,468	6810
Dist. 5: East Cent.	5	32,747	6549	7	45,456	6493	7	39,521	5645	2	20,991	10495	..	.....	....	..	.....	....	2	18,911	9455	..	.....	....	..	.....	....	23	157,626	6853
Dist. 6: Northeast	7	35,090	5012	3	19,692	6564	2	16,398	8199	4	33,219	8304	1	6,297	6297	6	35,930	5988	1	6,700	6700	1	6,550	6550	1	6,848	6848	26	166,724	6412
Dist. 7-B: N. Cent.	185	652,409	3526	17	55,623	3271	4	20,041	5010	..	.....	....	..	.....	....	..	.....	....	23	70,105	3048	3	9,608	3202	2	5,800	2900	234	813,585	3476
Dist. 7-C: W. Cent.	59	336,980	5711	6	39,159	6526	11	67,844	6167	1	5,790	5790	2	12,716	6358	..	.....	....	6	28,511	4751	..	.....	....	..	.....	....	85	491,000	5776
Dist. 8: West	66	544,819	8254	16	129,935	8120	19	132,776	6988	..	.....	....	..	.....	....	..	.....	....	5	32,641	6528	..	.....	....	..	.....	....	106	840,171	7926
Dist. 9: North	94	420,100	4469	18	71,173	3954	15	57,560	3837	3	17,667	5889	..	.....	....	..	.....	....	4	19,055	4763	2	11,664	5832	1	5,685	5685	137	602,904	4400
Dist. 10: Panhandle	3	16,824	5608	..	.....	....	1	9,223	9223	..	.....	....	..	.....	....	..	.....	....	3	12,764	4254	..	.....	....	1	3,000	3000	8	41,811	5226
Utah	2	12,866	6433	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	1	4,761	4761	..	.....	....	..	.....	....	3	17,627	5875
Washington	1	3,714	3714	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	1	3,714	3714
West Virginia	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	..	.....	....	3	15,455	5151	..	.....	....	..	.....	....	3	15,455	5151
Wyoming	13	76,499	5884	11	78,408	7128	9	68,058	7562	..	.....	....	..	.....	....	..	.....	....	2	3,830	1915	2	17,018	8509	..	.....	....	37	243,813	6589
U.S. Total, 1951	1001	4,800,423	4795	340	1,931,968	5682	236	1,210,969	5131	60	549,991	9166	27	231,253	8564	20	142,836	7141	177	966,175	5458	49	274,955	5611	46	223,338	4855	1956	10,331,908	5282
U.S. Total Earlier Years																														
1937	203	831,123	4094	119	615,007	5168	3	9,036	3012	3	19,377	6459	3	24,574	8191	..	.....	....	33	77,389	2345	15	51,145	3410	..	.....	....	379	1,627,651	4295
1938	229	944,455	4124	144	815,186	5661	7	25,027	3575	4	23,657	5914	4	27,115	6779	..	.....	....	31	102,440	3350	11	49,634	4512	3	12,042	4014	433	1,999,556	4618
1939	224	782,289	3492	190	998,595	5256	..	.....	....	1	7,999	7999	3	24,709	8236	..	.....	....	33	103,450	3135	22	92,626	4210	..	.....	....	473	2,009,668	4249
1940	262	957,167	3667	167	914,442	5476	..	.....	....	2	12,792	6396	..	.....	....	..	.....	....	46	122,439	2662	16	55,983	3499	..	.....	....	493	2,062,823	4193
1941	301	1,165,966	3874	261	1,335,648	5117	..	.....	....	3	23,505	7835	2	7,109	3555	..	.....	....	58	177,974	3069	25	89,263	3571	..	.....	....	650	2,799,465	4307
1942	288	1,199,382	4165	163	879,116	5393	..	.....	....	13	121,620	9355	2	13,517	6759	..	.....	....	48	167,428	3562	10	50,712	5071	..	.....	....	524	2,431,775	4650
1943	276	1,232,396	4465	127	565,454	4452	132	559,090	4236	15	140,564	9371	9	88,031	9781	3	25,589	8530	56	212,814	3800	16	90,372	5648	10	58,996	8530	644	2,973,306	4617
1944	326	1,422,250	4363	149	731,764	4911	135	659,987	4889	32	250,228	7820	9	75,436	8382	10	79,797	7980	102	417,944	4097	15	95,099	6340	27	111,174	4118	805	3,843,679	4775
1945	317	1,503,763	4774	158	894,688	5663	154	702,822	4564	30	269,915	8997	14	140,464	10033	6	54,162	9027	113	486,529	4306	15	67,455	4497	70	216,103	3087	877	4,335,901	4944
1946	308	1,359,787	4415	205	1,227,305	5987	160	707,585	4422	29	264,441	9119	42	411,425	9796	7	63,111	9016	75	272,564	3634	29	166,588	5744	115	406,774	3537	970	4,879,580	5030
1947	436	1,999,100	4585	300	1,564,181	5214	169	693,950	4106	44	352,691	8016	54	505,112	9354	17	136,258	8015	96	403,038	4198	49	223,026	4552	77	254,076	3300	1242	6,131,432	4937
1948	610	2,760,127	4525	307	1,714,345	5584	170	758,977	4465	70	626,026	8943	45	432,625	9614	18	167,441	9302	112	514,990	4598	48	259,025	5396	41	162,801	3971	1421	7,396,357	5205
1949	668	3,027,759	4533	296	1,666,576	5630	273	1,233,190	4517	69	644,454	9340	52	459,017	8827	16	131,981	8249	130	626,058	4816	49	220,023	4490	36	141,146	3921	1589	8,150,204	5129
1950	811	3,607,484	4448	308	1,791,195	5816	290	1,388,816	4789	67	572,807	8549	18	164,699	9150	12	101,512	8459	137	679,851	4962	35	171,314	4895	49	221,808	4527	1727	8,699,486	5037

PART 2: Unproductive Tests and Total Exploratory Tests

STATE or DISTRICT	DRY WILDCATS			DRY NEW PAY TESTS			DRY OUTPOSTS			TOTAL DRY			TOTAL EXPLORATORY TESTS		
	No.	Footage	Average Depth	No.	Footage	Average Depth	No.	Footage	Average Depth	No.	Footage	Average Depth	No.	Footage	Average Depth
Alabama	23	143,215	6226	....	.....	....	1	4,000	4000	24	147,215	6133	27	164,473	6091
Arizona	4	8,635	2158	....	.....	....	....	.....	....	4	8,635	2158	4	8,635	2158
Arkansas	89	343,746	3862	....	.....	....	8	38,934	4866	97	382,680	3945	119	488,002	4040
California	438	1,667,025	3805	5	28,894	5778	43	209,919	4881	486	1,905,838	3921	571	2,353,933	4122
Colorado	133	655,621	4929	....	.....	....	4	16,894	4223	137	672,515	4908	154	767,778	4985
Florida	4	22,109	5527	....	.....	....	....	.....	....	4	22,109	5527	4	22,109	5527
Idaho	1	12,844	12844	....	.....	....	....	.....	....	1	12,844	12844	1	12,844	12844
Illinois	746	1,807,185	2422	....	.....	....	....	.....	....	746	1,807,185	2422	855	2,109,009	2466
Indiana	432	756,785	1751	....	.....	....	2	3,020	1510	434	759,805	1750	488	864,440	1771
Kansas	840	3,122,391	3717	....	.....	....	....	.....	....	840	3,122,391	3717	1021	3,794,508	3716
Kentucky	184	422,932	2298	....	.....	....	....	.....	....	184	422,932	2298	220	499,408	2270
Louisiana	355	2,573,981	7250	1	8,294	8294	20	154,067	7703	376	2,736,342	7277	467	3,543,000	7586
North Louisiana	229	1,220,309	5328	1	8,294	8294	10	60,305	6030	240	1,288,908	5370	283	1,552,008	5484
South Louisiana	126	1,353,672	10743	....	.....	....	10	93,762	9376	136	1,447,434	10642	184	1,990,992	10820
Michigan	307	704,590	2295	....	.....	....	....	.....	....	307	704,590	2295	326	757,461	2323
Mississippi	163	1,146,150	7031	2	20,944	10472	11	72,882	6625	176	1,239,976	7045	200	1,426,918	7134
Missouri	7	6,969	9955	....	.....	....	....	.....	....	7	6,969	9955	7	6,969	9955
Montana	52	158,394	3046	1	2,476	2476	5	18,485	3697	58	179,355	3092	66	217,637	3297
Nebraska	90	432,408	4804	....	.....	....	8	41,544	5193	98	473,952	4836	121	585,923	4842
Nevada	2	15,431	7715	....	.....	....	....	.....	....	2	15,431	7715	2	15,431	7715
New Mexico	79	379,741	4806	1	7,114	7114	8	35,473	4434	80	422,328	4789	130	724,594	5573
North Dakota	9	38,351	4261	....	.....	....	....	.....	....	9	38,351	4261	11	62,261	5660
Ohio	26	92,337	3551	....	.....	....	....	.....	....	26	92,337	3551	33	117,004	3545
Oklahoma	681	2,819,238	4139	....	.....	....	....	.....	....	681	2,819,238	4139	853	3,683,831	4318
Pennsylvania	....	.....	....	....	.....	....	....	.....	....	....	.....	....	1	8,330	8330
South Dakota	3	8,083	2694	....	.....	....	....	.....	....	3	8,083	2694	3	8,083	2694
Tennessee	6	7,465	1244	....	.....	....	....	.....	....	6	7,465	1244	6	7,465	1244
Texas	3,638	16,217,981	4457	7	53,352	7621	227	969,144	4269	3,872	17,240,477	4452	4,888	23,050,296	4715
Dist. 1: South Central	218	727,230	3335	....	.....	....	16	49,116	3069	234	776,346	3317	275	942,107	3425
Dist. 2: Middle Gulf	226	1,367,078	6049	1	7,550	7550	35	196,777	5622	262	1,571,405	5997	366	2,241,653	6124
Dist. 3: Upper Gulf	271	2,073,593	7651	....	.....	....	9	68,056	7561	280	2,141,649	7648	392	3,048,170	7775
Dist. 4: Lower Gulf-S.W.	383	1,874,839	4895	1	6,140	6140	31	174,357	5624	415	2,055,336	4952	555	3,008,804	5421
Dist. 5: East Central	144	458,003	3180	....	.....	....	4	19,839	3959	148	477,842	3228	171	635,468	3716
Dist. 6: Northeast	99	535,669	5410	2	18,206	9103	5	30,876	6175	106	584,751	5516	132	751,475	5692
Dist. 7-B: North Central	987	3,046,292	3086	....	.....	....	15	46,304	3086	1,002	3,092,596	3086	1,236	3,906,181	3160
Dist. 7-C: West Central	317	1,449,685	4573	....	.....	....	7	23,282	3326	324	1,472,967	4546	409	1,963,967	4801
Dist. 8: West	361	2,457,453	6807	3	21,456	7152	13	84,054	6465	377	2,562,963	6798	483	3,403,134	7045
Dist. 9: North	592	1,973,296	3333	....	.....	....	91	275,603	3028	683	2,248,899	3292	820	2,851,803	3477
Dist. 10: Panhandle	40	254,843	6371	....	.....	....	1	880	880	41	255,723	6237	49	297,534	6072
Utah	28	123,807	4421	....	.....	....	....	.....	....	28	123,807	4421	31	141,434	4563
West Virginia	2	15,069	7534	....	.....	....	....	.....	....	2	15,069	7534	5	30,524	6104
Washington	....	.....	....	....	.....	....	....	.....	....	....	.....	....	1	3,714	3714
Wyoming	125	552,355	4418	....	.....	....	16	90,150	5634	141	642,505	4556	178	886,318	4979
United States Total, 1951	8,476	34,254,838	4045	17	121,074	7122	353	1,654,512	4687	8,837	36,030,424	4077	10,793	46,362,332	4295
U. S. Total, Earlier Years															
1937	1,943	7,173,550	3692	....	.....	....	....	.....	....	1,943	7,173,550	3692	2,322	8,801,201	3790
1938	2,179	7,012,901	3218	....	.....	....	....	.....	....	2,179	7,012,901	3218	2,612	9,012,457	3450
1939	2,488	7,764,816	3121	....	.....	....	....	.....	....	2,488	7,764,816	3121	2,961	9,774,484	3301
1940	2,672	8,649,828	3237	....	.....	....	....	.....	....	2,672	8,649,828	3237	3,165	10,712,651	3386
1941	3,047	9,651,013	3167	....	.....	....	....	.....	....	3,047	9,651,013	3167	3,697	12,450,478	3368
1942	2,652	9,320,691	3515	....	.....	....	....	.....	....	2,652	9,320,691	3515	3,176	11,752,466	3702
1943	2,951	10,702,429	3627	....	.....	....	36	164,155	4560	2,987	10,866,584	3638	3,631	13,839,890	3812
1944	3,425	13,470,846	3933	22	141,039	6411	73	383,802	5258	3,520	13,995,687	3976	4,325	17,839,366	4125
1945	3,486	14,504,642	4161	39	284,441	7293	108	375,062	3473	3,633	15,164,145	4174	4,510	19,500,046	4324
1946	3,830	14,399,824	3760	38	274,592	7226	109	418,919	3843	3,977	15,093,335	3795	4,947	19,972,915	4037
1947	4,407	17,068,382	3873	59	330,897	5608	166	659,738	3974	4,632	18,059,017	3899	5,874	24,190,449	4118
1948	5,618	22,227,790	3957	23	127,597	5548	135	574,023	4252	5,776	22,929,410	3970	7,197	30,325,767	4214
1949	5,914	22,044,695	3728	46	183,003	3978	172	747,516	4346	6,132	22,975,214	3747	7,721	31,125,418	4031
1950	6,876	25,882,014	3764	41	153,029	3732	353	1,507,382	4270	7,270	27,542,425	3789	8,997	36,241,911	4028

fication 1951 far outreached any previous year. A total of 9705 strict or rank wildcats were completed last year to top the previous peak of 7891 drilled in 1950.

Of these wildcats, 1238 opened new oil, gas, or distillate fields for a score of 12.7 percent of the total drilled. That is about one commercial producer out of eight wildcats drilled. A year before the success percentage amounted to 12.9 percent, or about one discovery out of every 7¾ tests drilled.

The average for the preceding 14-year period, 1937-1950, was 11.5 percent producers, or about one out of 8⅔ wells. So it can be seen that, while the1951 wildcatting record was not particularly impressive as far as producer-to-dry hole ratios are concerned, it was impressive from the total results and from an historical comparison.

Wildcatting during 1951 accounted for a considerably greater share of total drilling activity than it customarily does. During the year, 9705 wildcats completed amounted to 22.2 percent of the total wells drilled for production (exclusive of service wells). In 1950, the count had been 18.7 percent wildcats, but for the 1937-

Ratio of Wildcatting to All Drilling and Proportion of Wildcats Discovering New Fields. By Districts, 1937-1951.

STATE or DISTRICT	FOURTEEN YEARS. 1937-1950						YEAR 1951					
	Total New Wells Drilled for Oil or Gas	*STRICT WILDCATS					Total New Wells Drilled for Oil or Gas	*STRICT WILDCATS				
		TOTAL			PRODUCTIVE			TOTAL			PRODUCTIVE	
		Number	Percent of All Wells	Dry	Number	Percent of All Strict Wildcats		Number	Percent of All Wells	Dry	Number	Percent of All Strict Wildcats
Alabama	264	188	71.2	183	5	2.7	53	23	43.4	23	.....	.....
Arizona	41	41	100.0	41	.....	.....	4	4	100.0	4	.....	.....
Arkansas	3,543	861	24.3	789	72	8.4	428	96	22.4	89	7	7.3
California	22,879	2,916	12.7	2,768	148	5.1	2,326	470	20.2	438	32	6.8
Colorado	1,022	280	27.4	254	26	9.3	299	149	49.8	133	16	10.7
Florida	157	140	89.2	139	1	0.7	3	4	133.3	4	.....	.....
Georgia	46	46	100.0	46	.....	.....	.....	.....	.....	.....	.....	.....
Idaho	5	5	100.0	5	.....	.....	1	1	100.0	1	.....	.....
Illinois	34,490	6,785	19.7	6,389	396	5.8	2,384	785	32.9	746	39	5.0
Indiana	8,046	2,251	27.9	2,039	212	9.4	1,358	469	34.5	432	37	7.9
Iowa	18	18	100.0	18	.....	.....	.....	.....	.....	.....	.....	.....
Kansas	31,140	5,151	16.5	4,345	806	15.6	4,283	997	23.3	840	157	15.7
Kentucky	12,382	1,338	10.8	1,202	136	10.2	1,328	203	15.3	184	19	9.3
Louisiana	20,494	2,694	13.1	2,307	387	14.4	2,255	401	17.8	355	46	11.5
North Louisiana	10,728	1,446	13.5	1,326	120	8.3	1,256	250	19.9	229	21	8.4
South Louisiana	9,766	1,248	12.8	981	267	21.4	999	151	15.1	126	25	16.5
Maryland	8	8	100.0	6	2	25.0	44	.....	.....	.....	.....	.....
Michigan	12,156	3,612	29.7	3,343	269	7.4	698	323	46.3	307	16	4.9
Mississippi	3,162	1,087	34.4	1,035	52	4.8	392	179	45.7	163	16	8.9
Missouri	857	214	25.0	210	4	1.9	11	7	63.6	7	.....	.....
Montana	3,425	308	9.0	266	42	13.6	267	56	21.0	52	4	7.1
Nebraska	410	240	58.5	228	12	5.0	184	103	56.0	90	13	12.6
Nevada	3	3	100.0	3	.....	.....	2	2	100.0	2	.....	.....
New Jersey	1	1	100.0	1	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico	7,199	840	11.7	728	112	13.3	717	108	15.1	79	29	26.8
New York	11,336	65	0.6	63	2	3.1	317	.....	.....	.....	.....	.....
North Carolina	14	14	100.0	14	.....	.....	.....	.....	.....	.....	.....	.....
North Dakota	24	12	50.0	12	.....	.....	10	10	100.0	9	1	10.0
Ohio	15,995	383	2.4	335	48	12.5	885	28	3.2	26	2	7.1
Oklahoma	37,949	4,905	12.9	4,104	801	16.3	5,287	786	14.9	681	105	13.3
Oregon	9	9	100.0	9	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	27,836	82	0.3	49	33	40.2	877	1	0.1	.....	.....	.....
South Carolina	6	6	100.0	6	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota	30	30	100.0	30	.....	.....	3	3	100.0	3	.....	.....
Tennessee	467	237	50.7	220	17	7.1	6	6	100.0	6	.....	.....
Texas	139,508	22,591	16.2	19,615	2,976	13.2	17,795	4,314	24.2	3,638	676	15.7
Dist. 1: S. Central	4,487	1,849	41.2	1,749	100	5.4	609	246	40.4	218	28	11.4
Dist. 2: Middle Gulf	[1]	[1]	.....	[1]	[1]	.....	798	272	34.1	226	46	16.9
Dist. 3: Upper Gulf	14,000	2,331	16.7	2,024	307	13.2	1,541	334	21.7	271	63	18.9
Dist. 4: L. Gulf-S.W.	26,809	5,511	20.6	4,792	719	13.0	1,692	449	26.5	383	66	14.7
Dist. 5: East Central	[2]	[2]	.....	[2]	[2]	.....	472	153	32.4	144	9	5.9
Dist. 6: Northeast	13,913	1,742	12.5	1,606	136	7.8	686	111	16.2	99	12	10.8
Dist. 7-B: N. Central	[3]	[3]	.....	[3]	[3]	.....	2,802	1,195	42.6	987	208	17.4
Dist. 7-C: W. Central	[4]	[4]	.....	[4]	[4]	.....	1,532	383	25.0	317	66	17.2
Dist. 8: West	32,676	2,879	8.8	2,418	461	16.0	3,846	432	11.2	361	71	16.4
Dist. 9: North	39,332	8,139	20.7	6,897	1,242	15.3	2,936	693	23.6	592	101	14.6
Dist. 10: Panhandle	8,291	140	1.7	129	11	7.9	881	46	5.2	40	6	13.0
Utah	142	78	54.9	72	6	7.7	36	31	86.1	28	3	9.7
Virginia	80	21	26.3	14	7	33.3	.....	.....	.....	.....	.....	.....
Washington	28	28	100.0	28	.....	.....	1	1	100.0	.....	1	.....
West Virginia	10,932	101	0.9	67	34	33.7	630	5	0.8	2	3	60.0
Wyoming	3,344	573	17.1	470	103	18.0	759	140	18.4	125	15	10.7
Total U.S.	409,448	58,162	14.2	51,453	6,709	11.5	43,643	9,705	22.2	8,467	1,238	12.7
U.S. Total by Years, 1937-1949												
1937	32,474	2,182	6.7	1,943	239	10.9						
1938	27,764	2,443	8.8	2,179	264	10.8						
1939	26,654	2,746	10.3	2,488	258	8.4						
1940	29,161	2,982	10.2	2,672	310	10.4						
1941	30,149	3,409	11.3	3,047	362	10.6						
1942	19,729	3,001	15.2	2,652	349	11.6						
1943	18,641	3,298	17.7	2,951	347	10.5						
1944	23,733	3,885	16.4	3,425	460	11.8						
1945	24,482	3,946	16.1	3,486	460	11.7						
1946	28,145	4,242	15.1	3,830	412	9.7						
1947	31,084	4,983	16.0	4,407	576	11.5						
1948	37,448	6,410	17.1	5,618	792	12.3						
1949	37,812	6,781	17.9	5,914	867	12.8						
1950	42,173	7,891	18.7	6,876	1,015	12.9						

* Exclusive of all tests seeking new pay zones or outposts attempting to extend known fields.

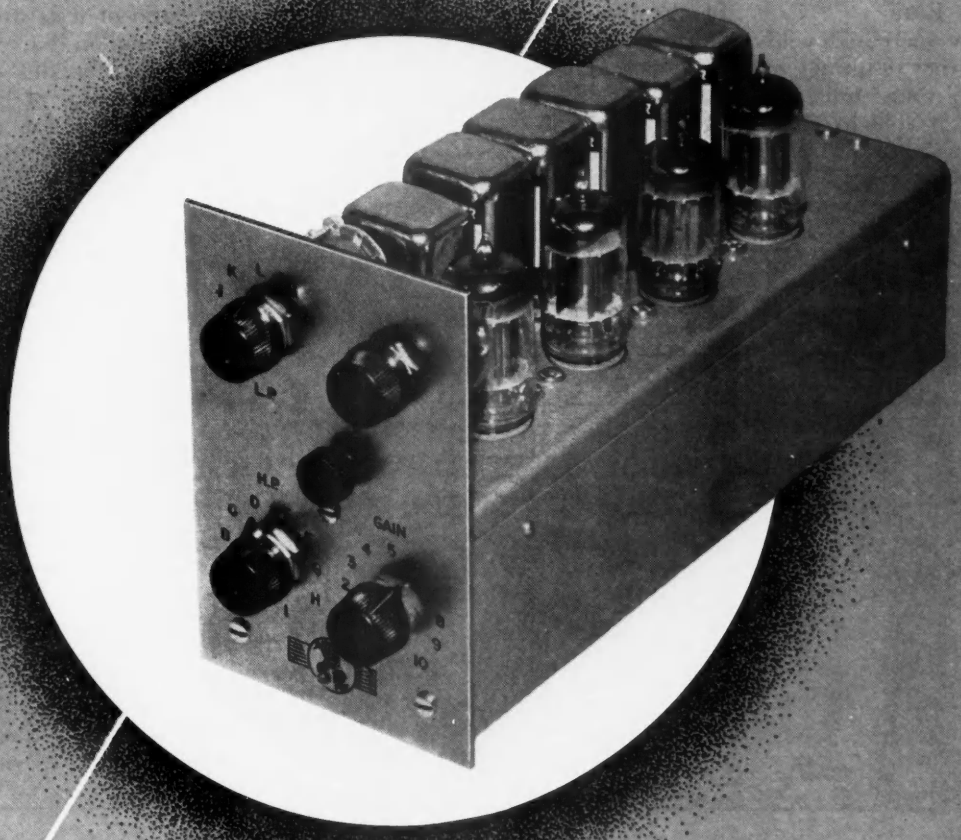
[1] Dist. 2. included with Dist 4.

[2] Dist. 5 included with Dist. 6.

[3] Dist. 7-B included with Dist. 9.

[4] Dist. 7-C included with Dist. 8.

Amplifier



The amplifier with its filters, gain and automatic volume control is the heart of the seismic recording system. Continued development by SSC of its amplifier is carried out by its experienced research group, augmented by the field research portable laboratory group.

The flexibility of this amplifier to meet varying conditions assures high quality records even in the most difficult areas.

SSC is constantly striving to provide a more effective seismic exploration service for the petroleum industry.

Seismograph Service Corporation

Seismic Surveys — Gravity Surveys — Pilot Crews — Lorac

TULSA 1, OKLAHOMA, U.S.A.

1950 period wildcats amounted to only 14.2 percent of the total drilled for production.

The part played by wildcatting in the over-all drilling picture has continued to increase steadily through the years. As mentioned above, the year just past hit a new all-time high in wildcat drilling, and in so doing also boosted the wildcat share of total drilling to a record 22.2 percent. In the first full year after the second world war only 15.2 percent of all wells drilled for production were classed as rank wildcats. During the last year before the war, 1941, the wildcat share was an even lower 11.3 percent. However, in 1937 less than 7 percent of all wells were wildcat tests.

Declining Ratio

Despite the vastly increased wildcatting rates and the resulting reserves uncovered by those tests, the industry has not been able to maintain the prewar ratio of reserves to producing rates. Before the war an average of two barrels was found for every barrel produced, but postwar discoveries have averaged only 1.6 barrels for each barrel brought to the surface.

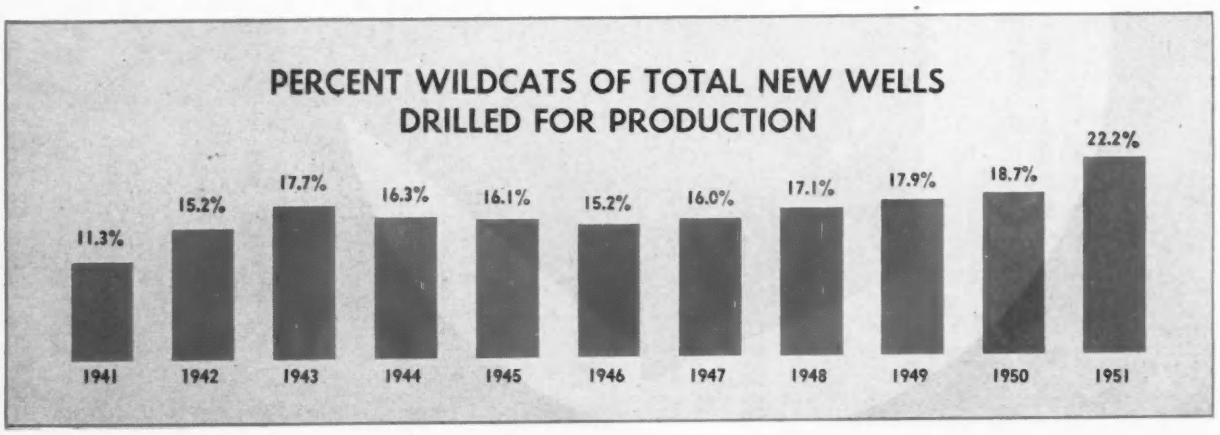
In 1938, when 3 billion barrels of new oil were discovered, it was equivalent to 2.5 barrels for every barrel produced during the year. However, in 1948, when the larger volume of nearly 4 billion barrels was found, it was equal to only two barrels for every barrel produced because output had increased so sharply. In 1950, more oil was discovered or proven than in 1938, but the ratio to production was only 1.7 barrels compared with 2.5 in 1938. These figures point to the increased need for finding substantially larger volumes of oil when production rises. And with the prospects for increased crude production being needed, the only answer can be further stepups in wildcatting and drilling in general. This program must be increased not only because of the desirability of maintaining a healthy relationship between reserves and increasing producing rates, but because reserves are becoming increasingly hard to find.

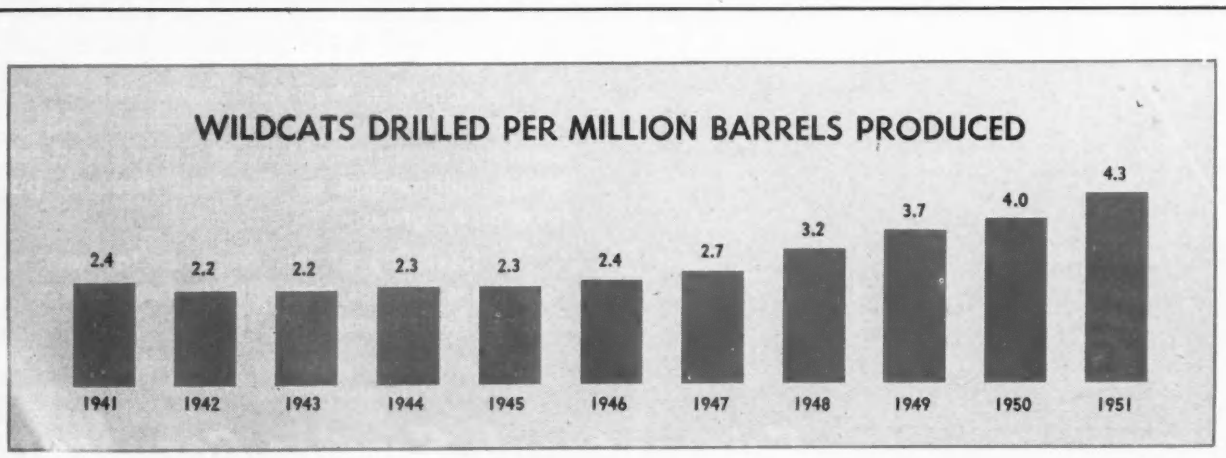
Oil discovered in recent years has not kept abreast of the increased amount of wildcat drilling, and consequently fewer barrels of oil are now being found per wildcat drilled than was true in the prewar era. Postwar years have witnessed an almost steady decrease in oil found per wildcat drilled.

In 1937 and 1938, about 1¾ and 1¼ million barrels of reserves, respectively, were found for every wildcat completed, but that ratio had dipped to about ⅓ million barrels per test during 1950 and 1951. During the five years immediately preceding the war, an average ratio of 947,000 barrels of new oil was found for every wildcat. During the five postwar years the amount has been reduced to almost one-half of that average.

Wildcatting Success

Another comparison that attests to the need for increased wildcat drilling, as demands for the industry's products continue to be stepped up, is the ratio of tests drilled each year to each million barrels of oil produced. During the year just concluded an average of 4.3 wildcat wells were completed for every million barrels brought to the surface, the highest in history. The prewar peak was in 1941 when only 2.4 wildcats were drilled for every million barrels produced during the year. This ratio has been steadily advancing since the close of the last world war.





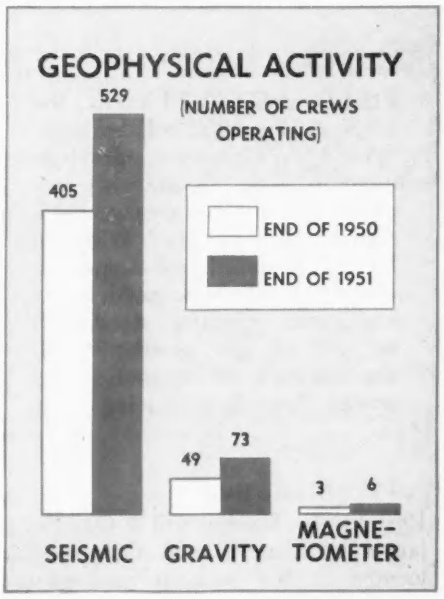
Geophysical Crews

Have Busiest Year

INTENSE interest in the Williston Basin helped put a record 634 geophysical and core drilling crews afield at the end of 1951. This figure compares with 480 active crews for 1950 and 425 for 1949.

Comparative activity was preponderantly higher among the geophysical crews, there having been 608 units busy in this type of operation at the end of 1951 compared with 458 in 1950, and 432 in 1939, whereas core drilling crews at work numbered 26 in 1951 as compared with 22 in 1950 and 20 in 1949.

All divisions of geophysical activity shared in the increase, with seismic operations accounting for the greatest numerical gain. There were 529 busy seismic crews in 1951 compared with 405 in 1950. Gravimeter crews were up to 73 from 50 for the year before, and magnetometer units numbered 6 as compared with 3 at end of the previous year.



Percentagewise, seismic activity dipped from 88.6 percent of all geophysical operations in 1950 to 87.4 percent in 1951.

North Dakota, site of the initial Williston Basin strike, registered the greatest percentage gain in geophysical operations, having had 27 active units in 1951 compared with 5 in 1950.

Numerically, the big gainer in geophysical operations was Texas, which had 199 crews at work at end of 1951 compared with 171 in 1950.

Louisiana had more active geophysical crews per mile of territory than any area in the U. S. last year. There were 105 active crews in this state, up 25 from 80 the year before. Major interest was in South Louisiana, which accounted for the state's entire increase over 1950.

Geophysical and Core Drilling Activity at End of 1951 and 1950

(Figures represent number of crews. Data for 1950 as of December 31; for 1951, as of November 30. Source: Interstate Oil Compact Commission.)

STATE	GEOPHYSICAL CREWS: Seismic 1951	Seismic 1950	Gravity 1951	Gravity 1950	Magnetometer 1951	Magnetometer 1950	Total Geophysical 1951	Total Geophysical 1950	CORE DRILL CREWS 1951	CORE DRILL CREWS 1950	Total Geophysical and Core Drill 1951	Total Geophysical and Core Drill 1950
Alabama	4	4	2	1	..	..	6	5	2	..	8	5
Arkansas	7	9	..	..	..	..	7	9	1	..	8	9
California	19	17	4	3	..	..	23	20	..	..	23	20
Colorado	27	18	3	2	..	..	30	20	..	..	30	20
Florida	1	..	..	..	..	..	1	..	1	..	2	..
Idaho	1	..	..	..	1	..	2	..	..	..	2	..
Illinois	3	4	1	*4	..	..	4	*8	3	1	7	9
Indiana	..	5	..	..	..	..	..	5	..	..	..	5
Kansas	9	6	1	1	..	..	10	7	4	5	14	12
Louisiana	88	68	16	11	1	1	105	80	1	2	106	82
North Louisiana	14	12	2	4	1	1	717	17	1	1	18	18
South Louisiana	74	56	14	7	..	..	88	63	..	1	88	64
Michigan	..	..	..	..	..	..	..	..	4	5	4	5
Mississippi	12	17	1	1	..	..	13	18	1	2	14	20
Montana	36	14	2	1	..	..	38	15	..	..	38	15
Nebraska	12	14	..	..	..	..	12	14	..	..	12	14
Nevada	2	..	..	..	1	..	3	..	1	..	4	..
New Mexico	40	29	4	2	1	1	45	32	2	1	47	33
North Dakota	22	4	5	1	..	..	37	5	..	..	27	5
Oklahoma	31	23	1	1	..	..	32	24	..	..	32	24
South Dakota	7	3	1	1	..	..	8	4	..	..	8	4
Texas	173	149	25	21	1	1	199	171	5	6	204	177
East Texas	18	10	4	..	1	..	23	10	2	2	25	12
Southeast Texas	42	36	5	7	..	..	47	43	1	1	48	44
Southwest Texas	34	35	6	3	..	..	40	38	2	3	42	41
West Texas	79	68	10	11	..	1	89	80	..	..	89	80
Utah	10	4	..	..	1	..	11	4	1	..	12	4
Wyoming	25	17	7	..	..	..	32	17	..	..	32	17
TOTAL	529	405	73	50*	6	3	608	458*	26	22	634	480*

* Includes one soil analysis crew.

Prospecting Outlook

Is For Continued Deep Drilling

FIELD ACTIVITY in the U. S. during 1952 will be highlighted by intensive development in West Texas, with emphasis on the Spraberry; brisk exploration in the Williston Basin; and continued deep wildcatting in all areas, particularly California. Greater stress will be put on gas production as the network of interstate lines creeps through producing areas.

Spraberry Activity to Have Major Role in West Texas

Magnitude of the Spraberry Trend must be reckoned with in considering West Texas development during 1952.

The vast drilling program begun early in 1951 can be expected to continue unabated. The tempo will increase should more tubular goods and rotary rigs become available.

But while the Spraberry is occupying the attention of the majority of operators in West Texas, there will be a search for oil in other areas. One expected to come into prominence is the Delaware Basin, adjoining the Permian Basin on the west.

While there has been intermittent drilling in the Delaware Basin since oil first was discovered in West Texas during the 1920's, none of this activity is expected to match exploration there in 1952.

A motivating factor back of increased attention for the Delaware Basin is that it is the only place left in West Texas where sizeable blocks can be assembled to offer sufficient reward for the large expenditures necessary in the search for oil at deep levels. Several companies already have scheduled deep wildcats in the Delaware Basin, among them being Magnolia Petroleum Company in Culberson County and Gulf Oil Corporation et al in Reeves and Presidio counties.

However, in the midst of the greater attention on the far western counties and continued drilling in the Spraberry Trend will come further exploration in the Midland-Upton Basin proper, which paid off handsomely in 1951.

The Spraberry, on its east flank, must be interwoven in the Midland-Upton development. However, one of the deeper areas, Wilshire Ellenburger pool in Upton County, shows indications of being one of the year's outstanding discoveries and possibly one of the Permian Basin's major pools.

It was brought into being early in 1951 by the Sinclair Oil & Gas Company's McElroy Ranch Company 1, located in the western part of the county, 2½ miles southeast of the Wilshire Wolfcamp pool. The discovery was completed in the 12,500-foot level for 1681 barrels of 53.6-gravity oil daily. The discovery later was dually completed from the Strawn of the Pennsylvanian at 9400 feet for 288 barrels of 49.9-gravity oil daily. Even larger potentials have been registered since the discovery was drilled.

Another deep discovery in western Upton, from which additional development is mushrooming, was Gulf Oil Corporation's McElroy 1-H, 2½ miles east of the north side of the shallow McElroy pool, one of West Texas' earlier discoveries. Designated the Jigger Y pool, it produces from the Pennsylvanian in the 9250-foot level and has a rated potential of 817 barrels of 44-gravity oil daily.

The Pennsylvanian also paid off in the Midland County portion of the Midland-Upton Basin. However, it was in Midland that the impetus came that set off the tremendous development in the Spraberry. This came in the Tex-Harvey pool, a 1949 discovery. Expanded development here led to a leasing and wildcatting play that spread over nine counties. Included in this activity were Midland, Glasscock, Upton, Reagan, Dawson, Borden, Martin, Howard and Sterling.

The latter county came into the picture late in the year when production was found from the Spraberry at Honolulu Oil Corporation's Sugg 1-A A. A., 15 miles southwest of Sterling City and 6½ miles northeast of the nearest producer from the formation in the Seven D multipay pool of northeastern Reagan County.

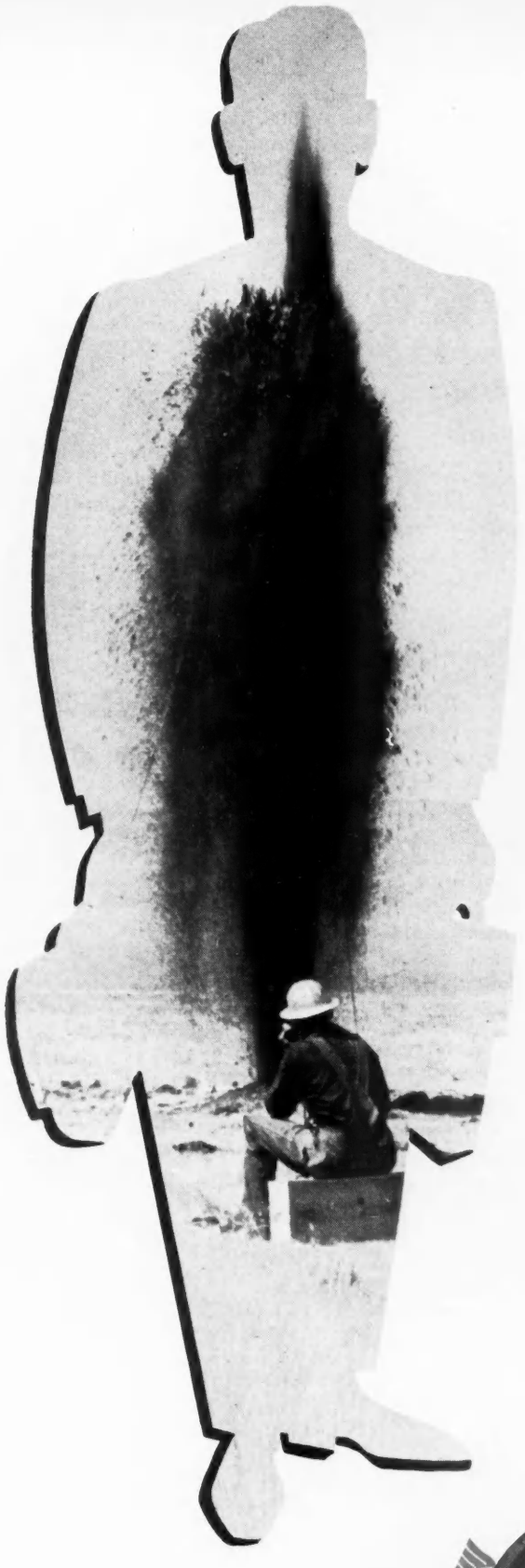
It was completed for a potential of 344 barrels of 42 gravity oil daily from the 5150-foot level. This well was completed natural and not subjected to the fracturing that is necessary in the majority of Spraberry wells.

The exploration in Sterling came after Spraberry production had been found across the northern part of Reagan, mushrooming off the Midland-Glasscock development, as did the greatly accelerated drilling in Upton. Production from the formation was found to exist in Upton as far south as the Flat Rock pool, south of the Benedum area, which also saw several completions from the horizon.

The magnitude of the Spraberry development is reflected in Railroad Commission statistics which reveal that the 80 wells at the start of 1951 had been increased ten-fold by the end of the year. Pools designated by the commission, which adopted a policy in August of considering the area to be producing from a single huge structure, increased from seven to 18. The latter figure would have been much larger if it had not been for the commission's policy, which included the placing of wells in the nearest area, oftimes six to eight miles away.

Scurry County, which dominated West Texas development in 1949 and 1950, also came in for attention during 1951 and is expected to continue active in 1952. Much of this year's development is expected in the zones found productive above the Canyon Reef lime, major producing reservoir of the vast area.

Included among these discoveries



meet Fred E. Romberg...

GSI's Southern Division Manager. Supervisors Clark Allen, Virgil Teufel, Earl Thomas, and Ray Wright complete the Division staff. When you explore for petroleum in the Southern States, their responsibility is to provide you with *personalized seismic services backed by all GSI facilities.* Whether your current exploratory problem is reworking older proven areas or taking long strides into the unknown, Romberg's nineteen years of practical experience added to the fifty-four man-years' experience of his staff, typify GSI's ability to focus real and proven talents on your most difficult problems.

FREDERICK E. ROMBERG
SOUTHERN DIVISION MANAGER

GEOPHYSICAL SERVICE INC.
6000 LEMMON AVENUE • DALLAS, TEXAS

SOUTHERN DIVISION OFFICE: 839 ESPERSON BUILDING, HOUSTON 2, TEXAS

of 1951 were the Parks Cisco sand, Brown Cisco sand and Fuller sand pools. Standard Oil Company of Texas found the Parks Cisco sand in the northern part of the Kelley-Snyder pool, the portion originally known as North Snyder. The initial well was the G. E. Parks 19, good for 209 barrels daily in the 6200-foot level.

Later came The Texas Company's P. L. Fuller 156-F, a 419-barrel producer at the 5200-foot level in the Cogdell area, which lies across the line of Scurry and Kent counties.

Scurry also received a new Canyon reef lime pool in the Imperial Production Company's Vernon B. Cox 1, three miles west of the Cogdell area. It was completed on pump for 242 barrels of 41.6-gravity oil daily, plus 6 percent water, at 7134 feet.

Expanding exploration on the southeast side of the Permian Basin was presaged by Ellenburger and Pennsylvanian discoveries in Crockett and Schleicher counties, along with one from the Strawn of the Pennsylvanian in Sutton County at the year's end which could set off an extensive leasing play.

The latter was The Pure Oil Company's S. M. Allison 1, which rated 308 barrels of oil daily, plus 29 percent water, from the Strawn in the 5150-foot level.

Among major possibilities was the Ellenburger discovery of Continental Oil Company in Crockett County, between the Todd Deep and Midway Lane Ellenburger pools and designated as the Elkhorn area. It was completed for 2580 barrels of 39.7-gravity oil daily from the 7235-foot level to set off a brisk drilling play, which still is continuing.

Northern Schleicher gave up three Pennsylvanian discoveries—North Hulldale, North Hulldale Strawn and Neva West—to set off a play that had spread to the southern part of the county at year's end.

Coming in for considerable activity during 1951 was Martin County. It received Spraberry and Pennsylvanian discoveries in the southwestern part of the county from Gulf Oil Corporation on the G. W. Glass land along with a Devonian pool in the northwestern part of the county at the Pan American Production Company et al F. D. Breedlove 1, 13 miles northwest of Tarzan. It was good for 2341 barrels of 41.3-gravity oil daily at 12,000 feet.

There also was an Ellenburger discovery, Tide Water Associated Oil Company's E. B. Dickenson 1, nine miles west of Stanton, but it was depleted from the horizon and efforts to complete from the Silurian were under way.

While these discoveries were in the western part of the county, considerable activity developed on the east side. This play is expected to continue in 1952.

The older oil producing counties of West Texas—Yoakum, Gaines, Andrews, Ector, Ward, Crane and Pecos—also came in for attention during the year, with selective drilling also on the schedule for 1952.

Delaware Basin to Attract Attention in New Mexico

As in West Texas, much attention in Southeast New Mexico will be turned toward the Delaware Basin during 1952. It flanks the West Texas portion of the Delaware Basin on the north.

Whereas the intermittent search for Delaware production in southeast New Mexico has been confined to shallow horizons in the past, efforts this year will be directed toward the deeper horizons, down to and including the Ellenburger.

However, the shifting of some of the play to the southwest isn't expected to slow the accelerated drilling pace in northern Lea and southern Roosevelt and Chaves counties.

The drilling campaign made 1951 one of Lea's most successful years since the Permian was exploited after the discovery of oil in the West Texas portion of the Permian Basin.

The majority of the areas were from the Pennsylvanian and Devonian, with a few in the Lower Permian, notably the Wolfcamp. However, as a whole, the new pools were small and deep, making them an expensive target.

One of the outstanding discoveries of the year was in southeastern Lea County, where Ellenburger production was found a mile west of the Dollarhide multipay pool of southwestern Andrews County, Texas. The discovery was the Skelly Oil Company, Seaboard Oil Company and J. C. Maxwell Mexico-State 1-J, completed for 583 barrels of oil daily in the 10,220-foot level. At the year's end, four wells had been completed in the area, from which production also was found in several shallower zones.

Anadarko Basin to Receive Play in Texas Panhandle

One of the most intensive exploration and leasing plays ever to be experienced in the Texas Panhandle portion of the Anadarko Basin undoubtedly will develop in 1952.

The play is mushrooming off a southwestern Oklahoma discovery in the Anadarko Basin—Flynn Oil Company's oil producer in Beaver County, just north of the Texas Panhandle. The discovery set a leasing play in motion in Ochiltree and Lipscomb counties.

Expansion of activity in southern Ochiltree also is anticipated as the result of two discoveries by the Texas Company at C. S. McGarraugh 1-B and J. L. Flowers 1. The latter is four miles east of the former and three miles north of the Lips area in northern Roberts County, where Sinclair Oil & Gas Company, the discoverer, continues to expand its operation.

Deep exploration also has extended to southern Roberts and across the line in northern Gray County, where Phillips Petroleum Company is active.

West Central Texas Activity To Center on New Areas

While activity is expected to continue brisk during 1952 in the older producing counties of West Central Texas, considerable expansion of development in newer producing counties on the north and west can be anticipated.

This is especially true in Stonewall County, once considered an operator's graveyard, and Nolan, Haskell, and Fisher.

Initial stimulation for greatly expanded development in Stonewall, which paid off handsomely in discoveries from the Pennsylvanian during 1951, began in 1950 and every indication points to its continuance in 1952.

The Pennsylvanian discoveries, racked up in the southern and northeastern parts of the county, were the outstanding developments of last year in West Central Texas. There was one Ellenburger area, the Frankirk pool by F. Kirk Johnson et al's Leon Anderson 1-E, a 196-barrel producer at the 5900-foot level.

The Pennsylvanian discoveries ranged from the shallow to the deeper members of the formation.

Nolan received a play comparable to that of Stonewall County. The discoveries there all were in the Pennsylvanian except one, which was an Ellenburger area found by Skelly Oil Company's Evelyn S. Cox 1, an 85-barrel completion at 7000 feet.

Fisher, lying between Stonewall and Nolan, came in for its share of attention, which paid off from both

First IN BRAZIL
In May, 1940, UNITED started the seismic survey of BRAZIL'S 3½ million square miles of land. From that date on, UNITED has been busy determining the oil possibilities of this vast country.
UNITED GEOPHYSICAL
UNITED
GEOPHYSICAL COMPANY
SEISMOGRAPH • GRAVIMETER • MAGNETOMETER
Herbert Hoover, Jr. President
1200 SOUTH MARENGO AVENUE, PASADENA 5, CALIFORNIA, U. S. A.
TULSA, HOUSTON, MIDLAND, NEW YORK, PITTSBURG, CALGARY
APARTADO 1085, CARACAS, VENEZUELA
RIO DE JANEIRO, BRAZIL • SANTIAGO, CHILE • BOGOTA, COLOMBIA • BEIRUT, LEBANON

the Pennsylvanian and Ellenburger.

Among the older producing counties, Jones County was out in front in discoveries last year, but was pushed by Throckmorton, Stephens. Callahan and Taylor.

More North Texas Counties Scheduled for Exploration

Mushrooming off successes in deep horizons in northwestern Grayson County has been a leasing play that extends south along the eastern border of North Texas which will bring some counties, as yet barren of oil production, into the 1952 exploration program.

Of the counties, only one—Denton—has production. The others are Collin, Tarrant and Dallas.

The play is in eastern Denton, western Collin, northeastern Tarrant and northwestern Dallas. Fannin County, east of Grayson, received some drilling in 1951, but nothing of commercial value developed despite some evidence of oil.

As for the older counties of North Texas, the 1952 program is expected to include continued scattered drilling to the Pennsylvanian and Mississippian horizons.

Central, Southwest Areas To Be Active in East Texas

Increasing success in locating new oil and gas fields in East Texas during 1951 presages one of the better years for the area.

As in 1951, most of the exploratory and development drilling in 1952 is expected to be concentrated on central and southwestern counties. There was considerable activity in the northern counties during last year, but not to the extent of that in other parts of the district.

One of the most interesting discoveries of 1951 was that from the Smackover in Rains County at R. J. Caraway's H. L. Puckett 1, six miles southeast of Emory. It was completed for a calculated open flow of 45 million cubic feet of gas per day along with 192 barrels of oil in the Smackover in the 12,000-foot level.

On the strength of this discovery, several major companies participated in one of the largest lease plays during 1951. The play extended from Southern Van Zandt County north through Rains, western Wood and Hopkins counties.

One of the most prolific areas, from a pay standpoint, during 1951 was the Ham-Gossett pool in Kaufman County, six miles northwest of Mabank. Production was found in a series of formations ranging from the Woodbine, Dexter, sub-Clarksville, Glen Rose to the lower Rodessa. Further exploration can be anticipated during 1952.

A sizeable development is expected in 1952 from the multipay gas-distillate discovery of The Pure Oil Company's Rufus Howard 1, 2½ miles northwest of Teague.

Brisk Development Certain In Proven South Texas Areas

Enlivened activity along the downdip Wilcox sand trend and new discoveries in the Basal Frio sector of the counties on the Gulf of Mexico during 1951 assure record development for South Texas.

The coastal area between Corpus Christi Bay and San Antonio Bay in Calhoun County yielded prolific production in 1951 from the Basal Frio formation between 700 and 9000 feet.

The Fulton Beach and Copano Bay areas now are classified as major oil reservoirs with only about two dry holes resulting from about 80 tests drilled. Production is from what is considered in South Texas a deep formation.

South Texas has had Frio sand production but it was in the upper part of the formation. The Superior Oil Company's major find in the Basal Frio in the Portilla area of San Patricio County set off a widespread search for this deeper production. The development will continue during 1952 because of success in 1951.

Another major development during 1951 in the bay sector of South Texas was the continued expansion of deep oil and gas sands in the St. Charles area of Aransas County by Western Natural Gas Company and Continental Oil Company. This discovery likely will be the start of deeper exploration in other South Texas areas.

The Wilcox sand sector of DeWitt, Victoria, Goliad and Lavaca counties was the scene of vast development during 1951, and the 1952 wildcat drilling program for this region during 1952 likely will be boosted.

The major development was the expansion of the Helen Gohlke-West Fordtran areas in DeWitt and Victoria counties. Drilling during 1951 proved a common reservoir for the area and classified the discovery as one of the most important in recent South Texas development. This field could be classed as the major discovery in Texas outside of the Spraberry area in West Texas.

Oil production is from the Wilcox sand just below 8000 feet with a gas and condensate sand having been developed around 5300 feet.

The strike, now known simply as the Gohlke field, has resulted in a major wildcat drilling program for DeWitt, Victoria and adjoining counties.

Humble Oil & Refining Company continued its development in the King Ranch sector, opening both new oil and gas reserves which will assure a sharp drilling program during 1952.

The search for shallow production also was boosted in 1951 in the Duval-Atascosa trend and increased drilling in 1952 is forecast for this region of South Texas.

Interstate Lines Spur Gas Quest on Texas Gulf Coast

Natural gas reserves, an industry problem ten years ago, became the wildcatters' goal during 1951 on the Texas Gulf Coast. Operators on the Texas Gulf Coast were happy to settle for a new gas discovery in 1951 because Interstate pipe lines brought a vast market for natural gas.

The major development for this coastal region was the gas discoveries even though some of the oil strikes may be developed into major finds during the 1952 expansion period.

Already classified as a major discovery is the West Hamshire area of Jefferson County. Here production of gas and condensate comes from around 12,000 feet. The wells are costly but the yield per well is enormous. Reports indicate that this area will be expanded considerably during 1952 and this development possibly could bring the area into the petrochemical and interstate gas pipe line picture.

Wildcatting in the southeast portion of the Texas Gulf Coast, including Jefferson, Chambers, Orange, Liberty and Hardin counties, was at a record pace during 1951 and this trend will continue during 1952.

In these counties new oil reserves continue to be opened on the flanks of old salt domes. Deep production was developed at Hull, Dayton, Liberty and Big Hill domes. Even the old Spindletop dome is receiving its third boom. New flank production on the north side is the cause of this activity.

Gas reserves which probably will develop into major proportions were added in Matagorda, Wharton, Jackson and Brazoria counties.

The old year also saw renewed

Here's why shot hole drillers use HAWTHORNE "BLUE DEMON" BLADES

2 DRILLS WITH

12 SETS "BLUE DEMON" BLADES

+ 2 ROLLER BITS = 24 DRAG BITS + 5 ROLLER BITS

Saving you up to $1200 per month!

A TYPICAL EXAMPLE OF FREE ENTERPRISE AT WORK...MORE FOOTAGE FOR LESS MONEY

Under the American system of free enterprise your shot hole driller is free to use the bit that gives him the most production with the least cost.

Your exploration dollar goes farther with Hawthorne "Blue Demon" Bits. The shot hole crew drills 75% of the medium and hard formations with "Blue Demon" Bits, costing $10.50 to $12.75, in place of roller bits that cost $60 to $100, at an average comparable speed and footage per bit.

The shot hole crew can drill from top to bottom through clay, shale, gravel, hard stringers of sandstone, cemented gravel and limestone.

Drilling is much faster than with drag bits in all formations and faster than roller bits in all but the hardest formations. Round trips are not required for bit change.

"Blue Demon" Bits are far more economical than drag bits, since they generally last five times longer, cost less than new drag bits and little more than the cost of retipping used bits.

PATENTS PENDING

● **This is an example of how Hawthorne "Blue Demon" Rock Cutter Bits reduce bit cost and allow more production with fewer round trips for bit changes.**

You always get cleaner, straighter holes faster with "Blue Demons".

HAWTHORNE "BLUE DEMON" ROCK CUTTER BITS REPLACEABLE BLADES 1⅞" - 10"

WRITE FOR ILLUSTRATED CATALOG

HERB J. HAWTHORNE INC.

P. O. BOX 7366, HOUSTON 8, TEXAS

wildcatting along the Wilcox sand trend from Colorado County eastward along the northern portion of the Texas Gulf Coast to the Sabine River.

This activity was enlivened by an apparent major Wilcox sand discovery in Grimes County and other strikes in Washington and Madison counties.

The Grimes discovery was made by Gulf Oil Corporation in the Yarboro area. The confirmation test now is being drilled by Gulf.

The Texas Company developed new production in northeast Madison County which now is being extended into Houston County by Woodley Petroleum Company.

New reserves, principally gas and distillate, were uncovered in Colorado and Austin counties as the result of a spirited wildcat drilling program. This drilling will continue during 1952.

Increased value in gas reserves has given the wildcatter a new incentive and this is doubly important in Wilcox sand drilling. The drilling in this area is regarded as difficult but apparently it is profitable because wildcatting has increased sharply since gas became a marketable commodity.

Shallow Production Trend Noted in South Louisiana

The coastal region of Louisiana, site of some of the nation's deepest oil fields, continued to place emphasis on deep production during 1951.

However, the trend was toward shallower production on the north fringe of South Louisiana with new pools being opened in Allen, Avoyelles and Livingston parishes which will cause continued development throughout 1952.

The Weeks Island Dome, Iberia Parish, already one of the nation's more profitable deep producing areas, regained its position as South Louisiana's deepest oil pool. Shell Oil Company completed H. T. Gonsoulin 1 flowing 466 barrels of oil daily through a 10/64-inch choke at 15,296-356 feet. Also, the well indicated production below 16,000 feet but the hole was plugged back to the higher level for final completion.

Deep drilling is costly but if the deeper sands yield volumes as large as the sand at Weeks Island the incentive will be to develop these deep zones in South Louisiana.

Magnolia Petroleum Company has entered the play for deeper production in its Hurricane Creek field of Beauregard and Allen parishes. The company already has production from below 14,000 feet which set off a new trend play in the Wilcox during 1951.

However, Magnolia now has set a new deep drilling record at its Ragley Lumber Company 1-D in Allen Parish. At last report, the well was drilling below 17,839 feet and is projected to 18,000 feet.

Wildcats found 12 new oil fields and 11 gas-condensate pools in South Louisiana during 1951.

Pacing the discoveries was Plaquemines Parish with three oil fields. Beauregard Parish had two and Allen, Avoyelles, Livingston, Iberville, Lafourche, and Terrebonne one each.

The most developed new discovery in 1951 was the Bay Coquille field in Plaquemines Parish, opened in February by The California Company.

The confirmation well was completed two miles from the pool opener and during the remainder of the year The California Company completed four other wells for a total of six producers. Gulf Refining Company also drilled a producer during the year. At year's end there were three rigs active in the field.

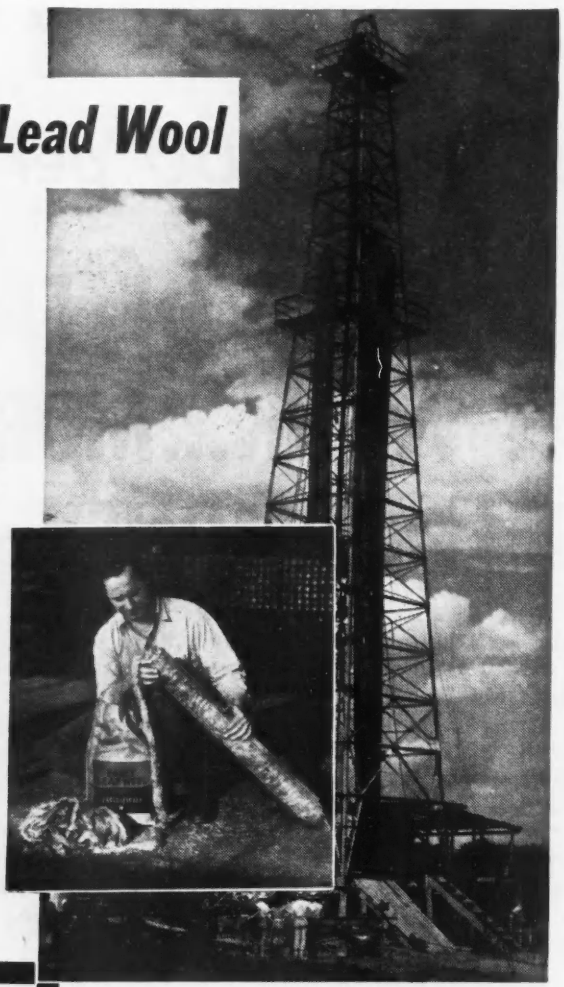
Gas and condensate reserves were expanded sharply during 1951 and the trend toward the development

Eagle-Picher Lead Wool

STOPS

bottom water

Rule out the risk of oil-wasting bottom water shutdown by tamping Eagle-Picher Lead Wool in the hole. The finely stranded, flexible metallic wool makes a water-tight plug that seals every crack and crevice. Comes in convenient 50-pound sacks—easy to place in special cartridge-shaped Eagle-Picher Wire Containers sized to fit all casings. Order through your jobber.



THE EAGLE-PICHER SALES COMPANY

Since 1843

Metallic Products Division,
General Office, Box 777
East Chicago, Indiana

Cincinnati • Kansas City
East St. Louis • Dallas • Houston

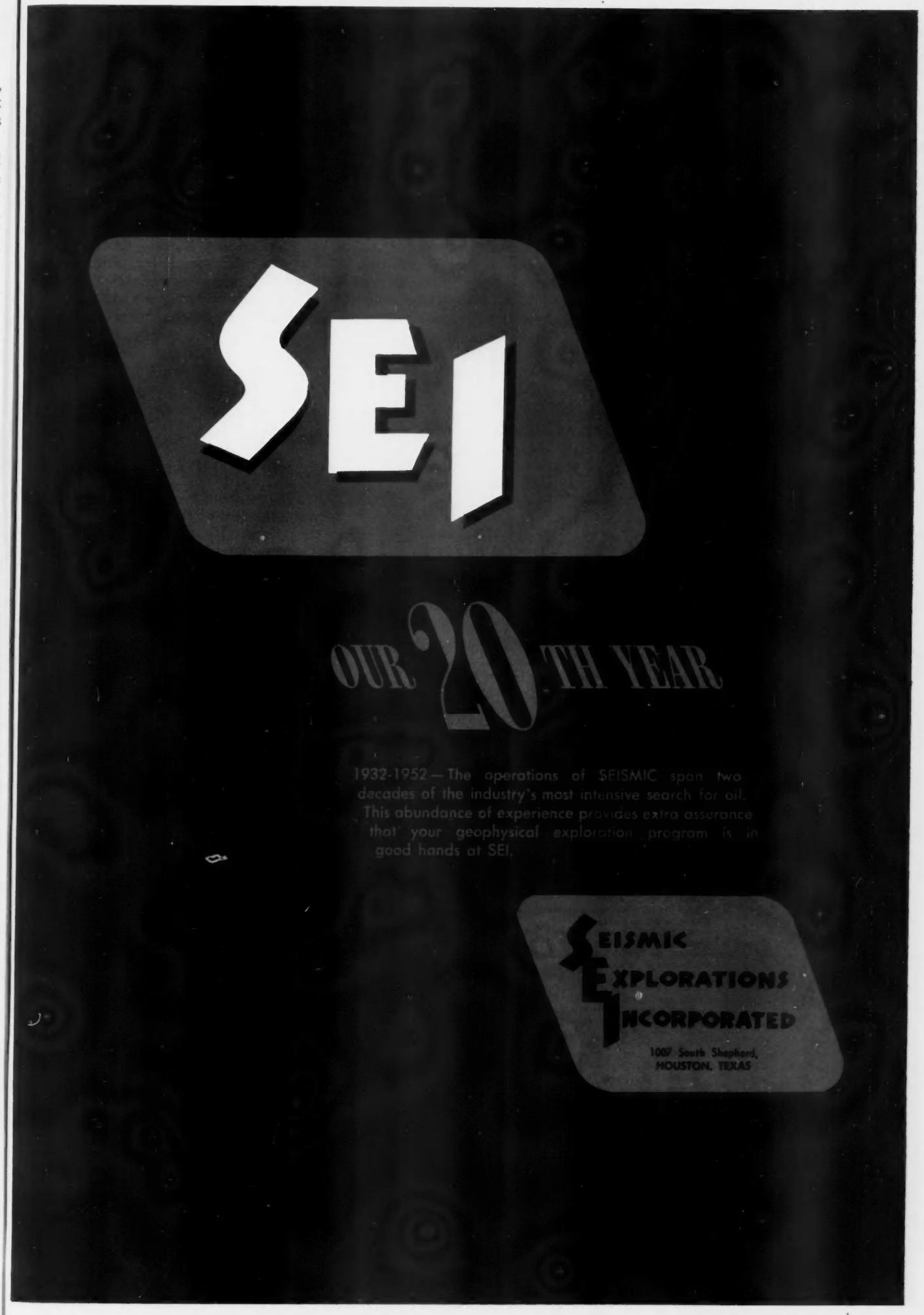
Member: Lead Industries Association

2065-LW

EAGLE EP PICHER

These 3 Eagle-Picher Bearing Metals meet most requirements

1. **Dreadnaught** — for extreme speed and heavy-duty conditions.
2. **Outlasta** — for medium speed and average-load conditions.
3. **Durable** — for low speed and light-duty conditions.


SEI
OUR 20TH YEAR
1932-1952 — The operations of SEISMIC span two decades of the industry's most intensive search for oil. This abundance of experience provides extra assurance that your geophysical exploration program is in good hands at SEI.
SEISMIC
EXPLORATIONS
INCORPORATED
1007 South Shepherd,
HOUSTON, TEXAS

of gas reservoirs will continue throughout 1952. The big demand for natural gas to fill interstate pipe lines makes such a venture profitable.

The most recent gas find was made late in December by Sunray Oil Corporation in the West Branch sector of Acadia Parish. The discovery flowed from 11,178-185 feet. Sunray probably will continue development in 1952.

Wilcox Play to Get Emphasis In North Louisiana Drilling

Continuance of widely diversified drilling activity is in prospect for North Louisiana during the year, barring more severe shortages of critical oil country tubular goods. While none of the discoveries of 1951 are listed in the category of major importance, operators are expected to maintain a steady grind in exploratory and development drilling.

New Wilcox discoveries and Wilcox wildcatting stole the lead in the district during 1951 and are expected to offer a repeat performance during the coming year. While erratic and lenticular Wilcox sands make development drilling uncertain, the long life of most Wilcox production makes it desirable for company and independent alike.

In other areas of the district, more attention is being focused on deeper production under old proven fields and it may be that these deeper horizons will furnish the bulk of oil and gas production of the future.

Probably the most important feature of 1951 in regard to increase in exploratory activity was an indicated extension of Cotton Valley (Bodcaw) production a distance of 28 miles east in Ouachita Parish. Probable extension is Feazel Interests and Monla Gas Company, Inc's., Breece Lumber Company 1, 3-18n-5e. The well had an estimated 34 feet of gas-condensate pay in the Bodcaw and instituted an inspired lease play in Ouachita Morehouse, Richland, and Madison parishes as 1951 came to a close.

Northwestern parishes of the province, around the widely known Sabine Uplift, because of offering of multiple pay zones and shallowness of many of the pays, will again draw a large bulk of North Louisiana's drilling activity.

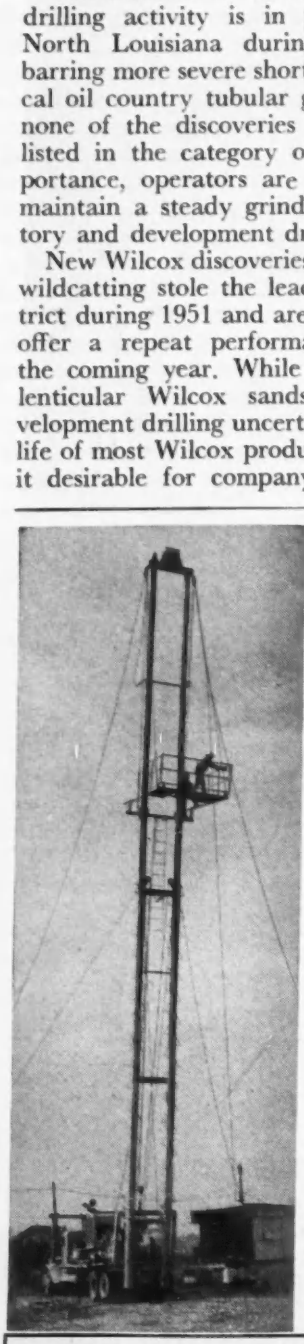
Central western parishes saw an increase in activity during the preceding year and bid fair to continue holding operators' interest due to the success of several exploratory efforts. The Carter Oil Company has contracted for thousands of acres of options in this area and must test some of the spreads with the drill during 1952. Under impetus of the options, other buyers have been more bold in this part of the state. Considerable acreage here is in large ownership.

In the north central area, operators will continue development of deep pays due to returns from production, while new pays and extensions are expected to add spice for coming drilling programs.

Central and eastern central Louisiana parishes, south and southeastern North Louisiana district, will have a large part in the year's activity with company and independent alike seeking the Wilcox. Several new fields were discovered in this area during 1951, none of them indicated major importance.

Steady Drilling, Leasing Anticipated In Arkansas

Drilling and leasing should continue at a steady pace in Arkansas, although real and threatened material shortages will probably be reflected in the scope of operations. South Arkansas is expected to remain in the drilling limelight, probably with emphasis switching more to the southwest counties. However, due to past per-



S & R

Custom Built

PORTABLE TELESCOPING POLE MASTS—

This S & R double ladder mast is of heavy welded steel construction, and is fabricated of 10¾" pipe and 8⅝" pipe. Overall dimensions when erected 87 feet to crown support beam and 52' when telescoped in traveling position. Approximate weight of the complete equipment is 12,000 lbs. The complete assembly includes the (1) poles, (2) breakdown shaft assembly, (3) attached racking platform (which positions itself when poles are raised), (4) pole adjusting screws, (5) a sheave assembly to be mounted on truck or trailer for raising the poles, (6) and a four or five 24 inch sheave crown block for ⅞" line. Available for truck, trailer, or skid mount.

For additional information write, wire, or phone.

S & R TOOL & SUPPLY CO.
P. O. Box 1755 155 McCarty
HOUSTON 1, TEXAS
Export: 233 Broadway, N. Y. 7, N. Y.

S&R TOOL SUPPLY CO. HOUSTON, TEXAS

NOW YOU CAN EASILY TAKE ACCURATE WIRE LINE MEASUREMENTS

THE CAVINS DEPTHOMETER

will tell you where bottom is in little more time than it takes to make a trip with your bailer Gives you accurate depth in plain figures—compensates for raising and lowering tools when feeling for bottom. Strong, light-weight, easily used, and priced right Send today for illustrated folder.

THE CAVINS CO.

formances, Union, Columbia, and Ouachita counties will pool the majority of coming tests. While no particular discovery in this sector is of major importance, development of several new fields and new pays will require considerable effort this year.

Successes enjoyed by operators in Miller County, extreme southwestern province of the state, will focus more attention on this sector. Lafayette County, adjoining Miller on the east, has several wildcats projected for 1952, with development of pays in old fields coming in for a share of Arkansas drilling programs.

A new discovery in Calhoun County, which was nearing completion at year's end, will lead to some development of its Meakin reservoir. However, low gravity of the crude detracts from its value and handling ability.

Smackover lime exploration in the southern part of the state will hold particular attention during the year, although depth range and expense, plus the record of production and development in some fields discovered in recent years, may serve to enhance shallower prospects. Several highly important Smackover tests were either in operation or were preparing to spud as 1951 closed. Among these was location for a lime test in southwestern Columbia County, just north of the state line. Two Smackover tests were active in Union County, 1 in Columbia, 1 in Lafayette, and 1 or 2 in Miller County. One Smackover discovery was completed in Union at year's end and another had tested oil from this zone and will probably be commercial.

An increase in gas outlets and connections, plus an increase in wellhead price contracts will lead to increased activity in the dry-gas area of northern Arkansas. In this part of the state, drilling operations are largely handled with cable tools.

For the first time in several years, eastern and northeastern counties of the state were prospected with gravity and geophysical surveys during 1951, a possible prelude to leasing plays in 1952 and/or exploratory drilling to evaluate acreage already under lease in some of these provinces.

Interest in Mississippi Moves to Northeast Area

Attention was hastily switched to the northeastern counties of Mississippi and northwestern Alabama during the last half of 1951 by indicated discovery of gas-condensate production in Monroe County, Mississippi. Success of the current and subsequent wells will have a very important bearing on the play, but already the known anomalies of this area have been re-leased and drilling deals are reported in the making.

While major interest in early 1952 will be in assembly of blocks and geophysical evaluation, the area will undoubtedly have several wildcats before the year end.

The well being watched was Union Producing Company and Malcolm McCaskill's J. T. Sanders 1, SW SW 22-15s-6e, a former 6060-foot Carter Oil Company wildcat abandoned in the early 1940's. It blew out while McCaskill was cleaning out at approximately 2900 feet and flowed wild for several days before it was brought under control. Union Producing then acquired a one-half interest in the well and block and took over operations.

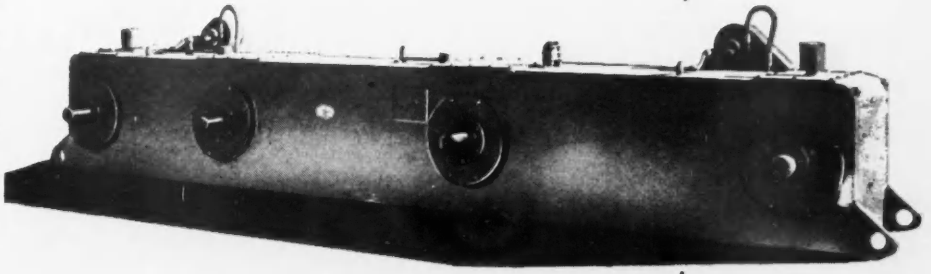
Greater demand for gas and availability of pipe line connections make desirable the prospect of a gas discovery in this sector. Sediments in this area are of Paleozoic age and rotary drilling costs and time are greatly increased over those of a hole of a comparable depth in central or southern Mississippi.

Mississippi is expected to draw con-

DESIGNED FOR YOUR RIG

SMOOTH POWER TRANSFER

T. F. C.
CUSTOM BUILT
Compounds



Get smooth power transfer with a Texas Flange Compound—custom built to fit your needs. Rugged, compact—they are non-slip, chain driven power units built to accommodate engines for any depth drilling by *any type* or *any size* rig. Our engineers will design a compound to fit your needs or we will manufacture to your specifications. Compounds can be built in one compact unit or in sections for versatility. Standard 'top quality' sprockets, chains, and bearings are used throughout. You get the best of materials and workmanship in every Texas Flange product.

Write today for full details.

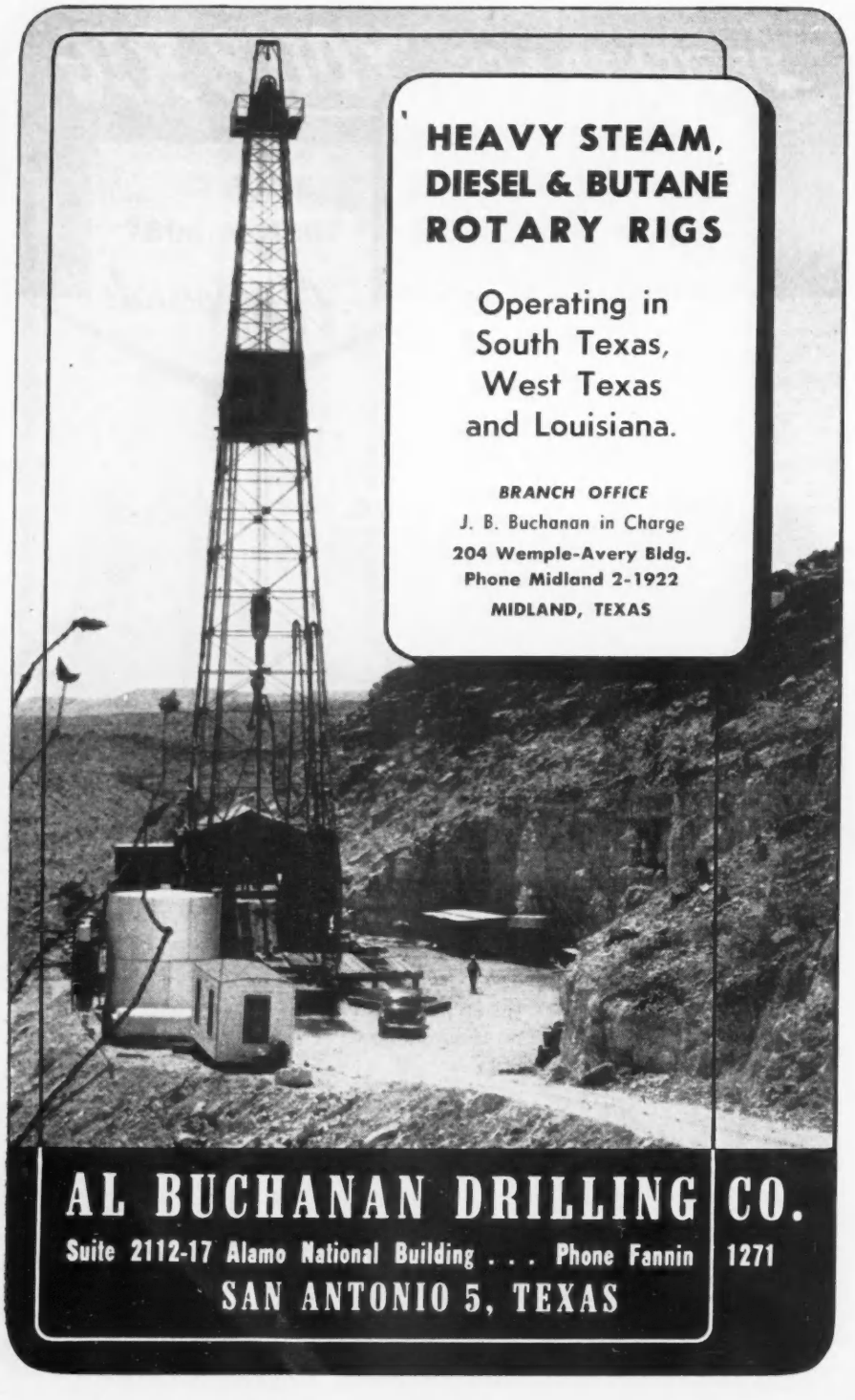
TFC
TEXAS FLANGE CO.
P. O. BOX 1352 PHONE 6-6877 ODESSA, TEXAS

tinued deep exploration, with the Smackover lime production possibilities receiving considerable attention. Again, immediate development of widespread wildcatting programs was in the balance as a highly important central Mississippi wildcat cored for the lime zone. Due to extreme depth range of the formation in the larger part of central and southern Mississippi, locations will be selected only after careful geophysical interpretation. While one Smackover test completed during 1951 indicated gas, condensate, and sulfur production, meagerness of the output would definitely not offset drilling costs and warrant a development program. This well was killed and temporarily abandoned.

Possibly a new era for the southern half of the state was opened during the latter part of 1951 with completion of a commercial oil well on the flank of a piercement-type salt plug. The Salt Basin area of Mississippi is well supplied with this type structure, numerous ones already proven by the drill and still others mapped by geophysics.

New crude and gas outlets are expected to advance testing of prospects in the southeastern quarter of Mississippi, but no discovery in the area during 1951 can as yet be termed as a major find. With emphasis in the area swinging to deep prospects, such as the Smackover, one well was recently started in Baxterville field of Lamar and Marion counties with intent being to test this zone.

The Wilcox counties of southwestern Mississippi are expected to continue carrying a large part of the state's exploratory drilling program with still expiring leases being one of the larger encouragements for drilling. Production from the Wilcox in 1951 was extended more than 80 miles east. While this discovery did not lead to an immediate increase in drilling efforts, operators are expected to pay attention to this shallow zone on deeper prospects henceforth. Majority of the state's new oil fields during 1951 were discovered in the Wilcox counties. Dry gas pay in the Sparta formation also became a reality in this sector with completion of the Stanton field discovery in northern Adams County.


HEAVY STEAM, DIESEL & BUTANE ROTARY RIGS
Operating in South Texas, West Texas and Louisiana.
BRANCH OFFICE
J. B. Buchanan in Charge
204 Wemple-Avery Bldg.
Phone Midland 2-1922
MIDLAND, TEXAS
AL BUCHANAN DRILLING CO.
Suite 2112-17 Alamo National Building . . . Phone Fannin 1271
SAN ANTONIO 5, TEXAS

Western Oklahoma Slated For Intensified Search

An intensified search in the western part of Oklahoma appears certain as major companies and strong independents continue heavy leasing within the boundaries of the Anadarko Basin. Budgets have been set up for a number of important key tests, any of which might result in the opening of a major field.

Shell Oil Company's strike at Elk City about four years ago was reflected in the number of tests drilled during the past year in Beckham, Kiowa, Woodward, Major and other western Oklahoma counties. At year's end Flynn Oil Company's School Land 1, SE SE SE 35-5n-23ecm, Beaver County, in the Oklahoma Panhandle area, sparked a play which is due to gain momentum as the year progresses.

Flynn's well undoubtedly was the most important strike of 1951 as it appears to have opened reef production from the Marmaton at 5540-49 feet. Success of reef plays in West Texas and Alberta has made Oklahoma operators extremely "reef conscious" and the Flynn well undoubtedly sets an exploration pattern which will have considerable bearing on major operations in the state.

While western Oklahoma continues to attract major operators, the eastern part of Oklahoma continues to draw the smaller operators where the plays are not so expensive.

Maintaining its daily average of

. . . of world-wide geophysical engineering experience go into every job we undertake.

Petty

GEOPHYSICAL ENGINEERING COMPANY

SAN ANTONIO, TEXAS

SEISMIC • GRAVITY • MAGNETIC SURVEYS

50,000 barrels plus per day, the old Seminole area embracing half a dozen counties in what is perhaps the most thickly drilled area in the world, will undoubtedly furnish many new discoveries this year. With multiple producing horizons at depths well within the 5000-foot limit, the tempo of new discoveries is expected to continue.

Counties which will draw more than usual exploration during 1952 include Pottawatomie, Lincoln, Okfuskee, Okmulgee and Pontotoc. Scores of small "pimples" have been developed in those counties during the past year.

Southern and central Oklahoma will claim attention with revival of some old fields such as Bebee, where flashy Hunton limestone production last year attracted a number of operators who have found that selective acidizing of this erratic formation more than offsets the rapid production decline of wells which originally were completed in the upper zone.

The Golden Trend area in Garvin and McClain counties will continue active during 1952 and new strikes may be expected in Stephens, Carter and Love counties.

Water-flooding is also expected to account for considerable new oil this year as major oil companies and independents continue to lease stripper areas for this purpose. Confined to the shallow sands of northeastern Oklahoma up to a few years ago, the technique is now being applied to horizons which are, in some instances, as deep as 2500 feet.

In general, Oklahoma oil men are confident they can continue to produce as much oil in 1952 as they produced in 1951—provided they can get tubular goods and other steel products.

Western Trend Development Due To Continue in Kansas

Heavy exploratory activity in the western part of Kansas is excepted, with operators continuing development of a "western trend" established by discoveries in seven counties. The past year also saw a big revival in exploratory drilling in northwestern Kansas on the flank of the big Kansas Uplift.

In the Kansas sector of the Anadarko Basin drilling is expected to get under way at a fast clip. Extensive play is also expected in Trego, Graham, Norton, Sheridan, Decatur and Gove counties. Several important wildcats were under way at year's end.

Discussing Kansas prospects for 1952, T. A. Morgan, conservation director of the Kansas Corporation Commission, reported that discoveries made during the last part of 1951 in Hodgeman, Ness, Seward, Meade, Finney, Fork and Clark definitely established a "western trend" in Kansas drilling. This trend is expected to intensify as a result of recent developments in Beaver County in the Oklahoma Panhandle, where Flynn Oil Company opened production at 5540-49 feet in what is believed to be reef formation.

Among the more important developments in Kansas last year was the discovery of the Purdy pool in Hodgeman County with mostly maximum wells of 3000 barrels each producing from the upper Mississippian.

Drilling is expected to be fairly heavy in Stafford County where Fischer area production was extended with completion of several maximum producers. Trego County operators are set for an extensive drilling program with the opening of the Ogallah pool.

Secondary recovery in Greenwood and adjoining counties in southeastern Kansas continues as an important phase in the state's production and 1952 is expected to see many waterflood projects initiated.

Are Your Oil Interests Closely Held or Family Owned?

This bank specializes in oil financing, particularly in connection with closely held or family owned oil and gas producing properties.

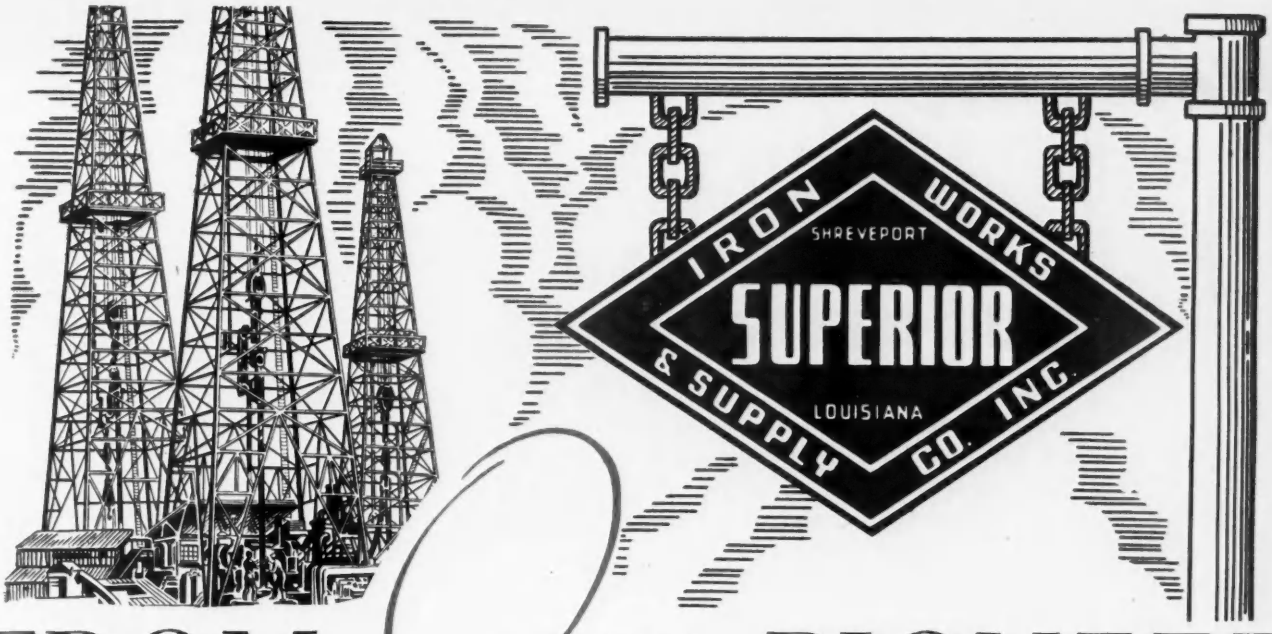
Oil and Natural Gas Department

Empire Trust Company
NEW YORK

Downtown Office:
120 BROADWAY
Equitable Building

Uptown Office:
7 W. 51st STREET
at Rockefeller Center

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION



FROM *One* PIONEER TO *Another* . . .

When those pioneers in major oil field development first tapped the vast East Texas underground stores in 1930, they knew even then they could call *Superior* for fast, dependable service.

Yes, Superior was on hand in 1930 as in 1951—pioneering to bring the oil, gas, and pipeline industries the best in equipment. No matter *what* your operation—drilling, production, pipelining, or refining—Superior can give you top-notch supplies and technical advice in a hurry. No matter *where* your operation—there's a Superior store in calling distance to fill your order immediately.

Save time and money—call your *Superior* store!

13 CONVENIENT STORES AND OFFICES TO SERVE YOU

- Shreveport, Louisiana
- Baton Rouge, Louisiana
- Lafayette, Louisiana
- Tinsley, Mississippi
- El Dorado, Arkansas
- Stephens, Arkansas
- Camden, Arkansas
- Tulsa, Oklahoma
- Midland, Texas
- Houston, Texas
- Carthage, Texas
- Abilene, Texas
- Dallas, Texas

New York City—Room 1212, 502 Park Avenue
Telephone: El Dorado 5-3572

SUPERIOR IRON WORKS & SUPPLY COMPANY, INC.

1202-04 MARSHALL STREET • P. O. BOX 1800 • SHREVEPORT, LA.

You can "CALL YOUR SHOTS" with CHIKSAN MUD MIXING GUNS

You have your choice of 3 Types of CHIKSAN Mud Mixing Guns...a Type to meet your needs for the most efficient operation with the mud-handling system you are using. Nozzle Tips of hardened steel are interchangeable.

1

The CHIKSAN *Non-Spin* Mud Gun can't spin because centrifugal force is neutralized by the offset in the barrel of the gun. Perforated flanges and Locking Pins permit locking the Gun in any desired position.

Non-Spin Type
MUD MIXING GUN

2

The CHIKSAN *Bottom Type* Mud Gun is designed for use where large size metal tanks are employed as mud pits. It is simple in construction; easy to install, and easy to operate.

Bottom Type
MUD MIXING GUN

3

The CHIKSAN *Spinner Type* Mud Gun is designed for use in tanks where the utmost in constant agitation is desired. The nozzles are set at an angle and the pressure in the line imparts a spinning motion which is accommodated by a Style No. 20 CHIKSAN High Pressure Swivel Joint. Furnished in any desired length as specified on order.

Spinner Type
MUD MIXING GUN

SOLD BY LEADING SUPPLY STORES EVERYWHERE

Ask your CHIKSAN or WECO Representative for details or write Dept. 2-WO.

CHIKSAN TRADE MARK REG.

CHIKSAN COMPANY
AND SUBSIDIARY COMPANIES
Chicago 28, Ill. BREA, CALIFORNIA Newark 2, N. J.
WELL EQUIPMENT MFG. CORP. HOUSTON 1, TEXAS
CHIKSAN EXPORT CO. BREA, CALIFORNIA NEWARK 2, N. J.

BALL-BEARING SWIVEL JOINTS FOR ALL PURPOSES

No Letdown in Wildcatting Expected in Illinois Basin

No appreciable decline in exploration in Illinois, Indiana and Kentucky is expected despite many handicaps. The year may be some better than in 1951, which was only a little behind the intense season of 1941.

Illinois should hold its own. Indiana should do likewise or perhaps show a slight decline. Kentucky should easily do as well as in 1951 and in all probability will do better.

Illinois

The wildcat drilling effort increased in 1951 with 751 wells drilled as compared with 699 in the year before. At the same time pool wells declined from 2221 to 1728.

The wildcatting pace is expected to continue as the demand for oil increases in the face of the world situation.

Outstanding developments in Illinois for 1951 were the following discoveries: East Sumpter pool, 32-4s-10e; North Zenith, 21-2n-6e; North Mason, 10-6n-5e; North Cantrell, 32-6s-5e; North Frogtown, 6-2n-3w; West Blairsville, 18-4s-7e; and extension of Bend pool, 21-5s-14w.

Indiana

Indiana had more wildcatting in 1951 than in 1950, while pool wells showed a decline. The average is expected to be about the same this year.

Principal developments in the state in 1951 were discoveries of the East Monroe City pool, Md-230-2n-8w; South Monroe City, 21-2n-8w; Washington, 13-3n-7w; East Terre Haute, 36-12n-9w; and extension of the Wellborn pool, 20-6s-14w.

Kentucky

Kentucky made the best showing in wildcat and pool well completions in the Tri-State area for 1951. Best bets in 1951 were the following discoveries: Pond River, 14-L-26; Baskett, 15-Q-25; South Henderson, 14-P-23; and extensions, North Zion, 24-Q-25; Robards, 22-O-23; and Bald Knob, 20-N-23.

Rate of Exploratory Drilling To Be Continued in Michigan

Michigan exploratory work has not produced any pool or pools in several years big enough to permit a lag in wildcatting without fairly fast declines in state production. Fields covering 5000 acres with cumulative production of 25 to 30 million barrels are among the best. Thus, exploratory drilling has followed a fairly con-

FOREMOST

IN THE

GEOPHYSICAL

FIELD

DOMESTIC OPERATIONS

Western

GEOPHYSICAL COMPANY
OF AMERICA

FOREIGN OPERATIONS

Western

GEOPHYSICAL COMPANY
INTERNATIONAL

Henry Salvatori, President

PACIFIC MUTUAL BUILDING, LOS ANGELES 14, CALIFORNIA

SHREVEPORT, LOUISIANA • MIDLAND, TEXAS • CASPER, WYOMING
CALGARY, ALBERTA, CANADA • MILAN, ITALY • SAN JOSE, COSTA RICA

stant rate for a number of years and the trend will continue in 1952.

The withdrawal or "wait and see" programs of some of the bigger companies very active in the state ten years ago were evidenced last year in a slight drop in exploratory drilling. Much independent wildcatting in Michigan normally has had the support of major companies by dry-hole contributions or acreage deals. On the other hand, the State Conservation Department reported it had 954,628 acres of state land under lease—mostly wildcat—at year's end, which was an increase of 191,000 acres in 12 months. State lease activity has been a good barometer of future exploration in the past.

The trend to "go north" continued last year and will dominate 1952 outpost work. Most of it is being done by big companies and the average fields found so far are at 4500 to 5000 feet. Wells cost $25,000 and up with individual well production ranging from 40 to 75 barrels.

Brazos Oil & Gas Company's State-Chester HE1, C NE NE, 15-29n-2w, Otsego County, was the most significant of the successful wildcats. Oil production, of 15 to 25 barrels per day, was found in the Salina at a plugback depth of 6638 feet. It was the first indicated commercial oil production in Michigan from this horizon as well as the first well in Otsego County, the outpost being 25 miles northeast of commercial production.

Core drilling continued to rank first in the basin and northern Michigan for geological mapping.

Ohio

A new gas field, larger than any found in recent years, was probable as the year closed. Two Oriskany sand gas wells discovered in Athens and Washington counties have been followed up by a promising gas showing at one foot in the sand in a well 20 miles north. A test in Muskingum County found gas, but had not been developed. All other exploratory wells were dry except a small producer in Coshocton County, and gassers in Tuscarawas, Perry, Lorain, and Richland counties.

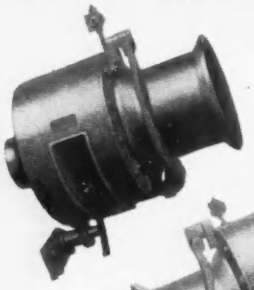
Activity in West Virginia To Be in East, Southeast

The area to watch in West Virginia will be the eastern and southeastern counties, where there will be considerable prospecting for Oriskany sand gas. The Terra Alta field of Preston County, W. Va., and the Red House field of Garrett County, Md., have been highly successful; and lately an Oriskany well with a volume of 1 million cubic feet was completed in Rockingham County, Va., near the village of Bergton, 22 miles north of Harrisonburg. This latter completion is many miles southeast of previous production and will encourage exploration in numerous mountain anticlines. Wildcats were already drilling in Fayette, Hampshire, Greenbrier, McDowell, Mingo, Pendleton, Preston, Randolph, and Tucker counties.

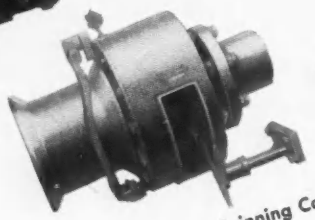
In the Red House field of Maryland were 32 gas wells in the Huntersville Chert and/or Oriskany sand. Twelve wells were dry through the Oriskany, 11 abandoned without reaching the Oriskany, and therefore incomplete, and 25 wells were drilling.

A substantial amount of the gas from both the Red House and Terra Alta fields will be carried westward through pipe lines already completed or now building, and will be used or stored in the Pittsburgh-Wheeling-Fairmont industrial area.

FOSTER SAFE CATHEADS



Air Master Breakout Cathead



Air Spinning Cathead

When we began building catheads over a quarter century ago, personal experience had taught us the importance of designing safety into every detail of our catheads.

For instance, on our air-controlled catheads a quick release valve releases the clutch instantaneously; on spinning catheads the spinning line is *not* hand wrapped; it will not foul and wind up; the driller stays at his position.

On breakout catheads are other special safety features.

Now a new and important safety feature, the Foster Safety Rope Guard, which can be attached to any Foster Friction Cathead, is available. Write for details.

Complete details on our line of catheads for every need are given in the Composite Catalog.

Here are features on both the Air Master Breakout and Air Spinning Catheads: Precise control . . . No adjustments . . . Direct diaphragm actuated . . . Instant disengagement . . . Crawl free drum . . . Fully enclosed . . . Quick change jerkline . . . Peak performance.

PLUS . . . Triple plate clutch on the Air Master Breakout . . . and single plate friction clutch for line pulls up to 12,000 lbs. on the Air Spinning Cathead.

There's a Foster Cathead for Every Need.

SOLD THRU SUPPLY STORES EVERYWHERE

Foster CATHEAD COMPANY

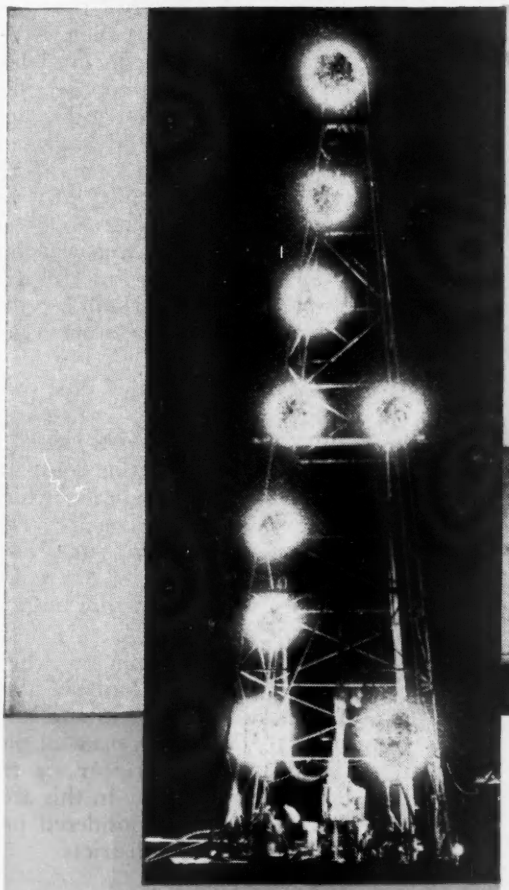
P O BOX 1675 WICHITA FALLS TEXAS

FACTORY REPRESENTATIVES

O. W. Frogge, Casper, Wyo. — Greenhead Service Co, Oklahoma City, Okla. — Tillery & Parks, Odessa, Texas — R. D. Cloninger, Lafayette, La. — R. N. Bean, Los Angeles 15, Cal.

JOY EQUIPMENT for the OIL FIELDS

THE WORLD'S LARGEST MANUFACTURER OF CORE DRILLS AND MOTORIZED DRILL RIGS



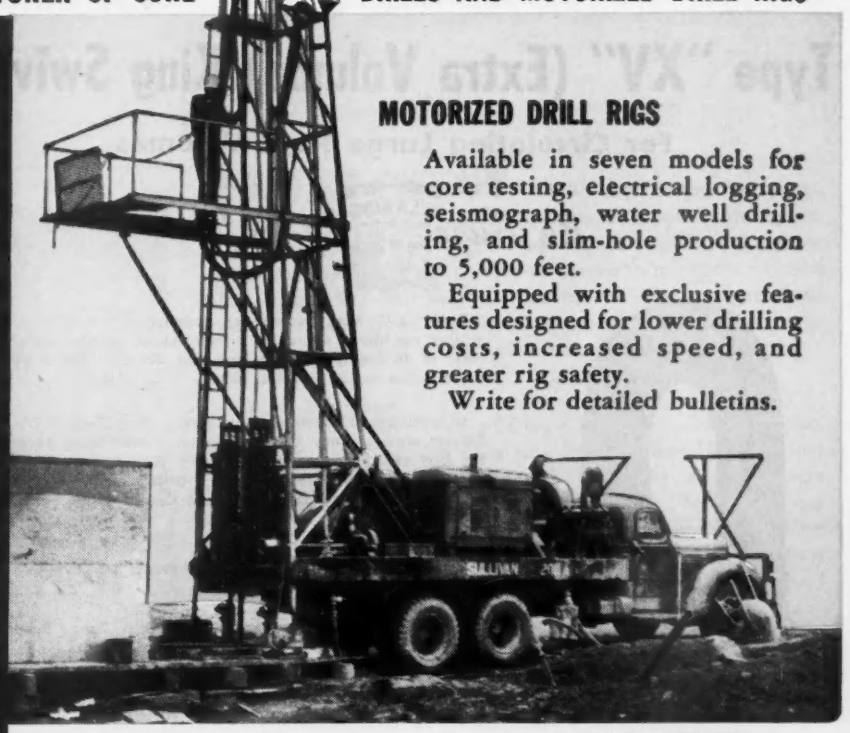
OIL FIELD STRING-A-LITE

Easily installed packaged lighting system for Portable Drill Rigs. Provides safe, troublefree lighting for oil drilling.

Package consists of neoprene encased connecting cable, connections and lighting fixtures.

Write for detailed bulletin.

Consult a Joy Engineer

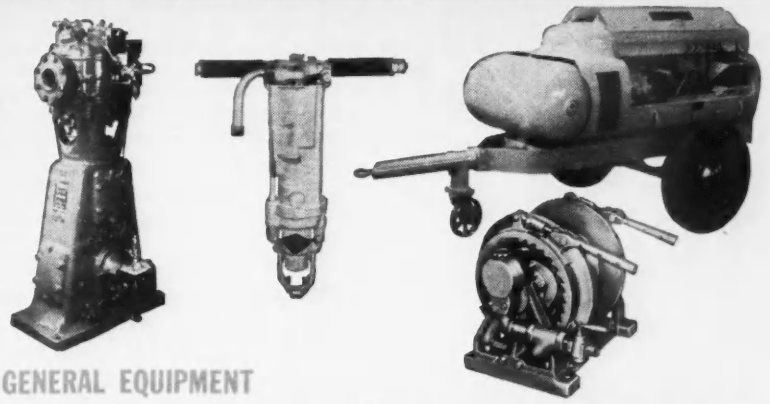


MOTORIZED DRILL RIGS

Available in seven models for core testing, electrical logging, seismograph, water well drilling, and slim-hole production to 5,000 feet.

Equipped with exclusive features designed for lower drilling costs, increased speed, and greater rig safety.

Write for detailed bulletins.



GENERAL EQUIPMENT

Portable and Stationary Air Compressors • Hand Held Drills • Hoists • Winches • Sheaves • Drill Pipe • Core Barrels • Fishtail Bits • Drag Bits • Water Swivels

W&D 03375

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

California Wildcatting Due For 20 Percent Increase

California in 1952 will make its greatest effort to find new oil reserves.

Wildcatting will probably increase 20 percent over the 1951 rate, which itself was at a record high. The estimate is based on a survey of the major companies, which indicated they intend to increase wildcat drilling by about 18 percent and the footage drilled by possibly as much as 25 percent. Among the independents, wildcatting is also expected to increase by about the same amount as reported by the majors.

As for development drilling, all segments of the industry report that while pipe is the controlling factor, their over-all plans call for about the same number of wells to be drilled in 1952 as in 1951. There are some indications that development drilling on a footage basis will increase between 10 and 15 percent. However, it was pointed out by several operators that rigs for deeper drilling in California are scarce and this factor may defer some of the operations.

The intensified search for new oil follows two very lean years in the state. In 1950 there were no major discoveries and 1951 was a poor year from the new oil reserve standpoint.

Probably the most important discoveries of 1951 were the Castaic Hills field in Los Angeles County, Rosedale in Kern County, and the Ethel-D pool in the old Midway-Sunset area of Kern County. It appears now that the only one of these finds that could grow into something of real importance is the Castaic Hills field. In this field there is yet considerable room for the limits of the field to extend.

From an oil reserve consideration it appears as if the development work in the San Ardo field of Monterey County, and the yet mysterious Sansinena-Whittier field in Los Angeles County were the two most important developments. San Ardo, which was entirely shut in until late in 1950 was not only reopened but was the scene of very active development. The oil in this field is 11 gravity but the pipe line which General Petroleum Corporation built into the field handles it by mixing about 10 percent distillate. It is estimated that San Ardo has very large reserves and as long as there is demand for this type of heavy crude, development will probably continue.

The Sansinena-Whittier field is a one-company field in a relatively heavily populated area of Los Angeles County. The operating company is The Union Oil Company, which has not released details on its wells. However, it is becoming more apparent that Sansinena is becoming a major oil reserve if it is not already that.

The Cuyama Valley, upon which many hopes had been built in 1949 and 1950, failed in 1951 to add anything new to the state's over-all picture. Wildcatting, however, is expected to continue heavy in this area in 1952 as it is still considered one of the better potential districts.

Northwestern New Mexico Due for More Wildcatting

The outstanding development of 1951 in Northwest New Mexico and the San Juan basin was the finding of oil by Thomas Doswell and others in the Tocito sand at a South Largo area wildcat in Rio Arriba County.

Continental Oil Company established oil production in the Ouray limestone at 7500 feet in the Table Mesa field of San Juan County where production previously was from the Dakota.

Additional wildcatting is in prospect because of the Tocito discovery as others seek to find production in the sand.

Type "XV" (Extra Volume) King Swivels

For Circulating Large Fluid Volumes

Be Sure IT'S A KING *Be Safe*

Type "XV" King Swivels are designed specifically for drilling conditions where the circulation of greater quantities of drilling mud is required than can be handled by conventional models of small swivels.

In addition to oversize watercourses, King Type "XV" Swivels provide many exclusive features that make them the first choice everywhere for Water Well Drilling, Geophysical Drilling, Working Over, Drilling Shallow Oil Wells, Core Drilling, Drilling in and Coring with Reverse Circulation.

Check these outstanding advantages you get with King Type "XV" Swivels:

- OVERSIZE WATER COURSES assure Large Fluid Volume.
- MOULDED RUBBER PACKINGS ELIMINATE the stuffing boxes.
- HARDENED WEAR-BUSHINGS eliminate the washpipes.
- THE PACKING AND WEAR-BUSHINGS can be renewed within a very few minutes without removing any other part from the swivels.
- ANGULAR-CONTACT BALL BEARINGS provide ample thrust capacity and insure radial stability.
- ALLOY STEEL CONSTRUCTION assures safety with minimum weight.
- SHORT, COMPACT DESIGN requires less room in the derrick.
- STREAMLINED—no projections to "hang up."
- CLOSED HOUSING PROTECTS THE BEARINGS.
- LUBRICATION, of BEARINGS, is by means of a grease gun.

This swivel fulfills a long felt need of the well drilling fraternity.

See your latest Composite Catalog for other King Oil Tool products.

KING OIL TOOLS

210 TERMINAL STREET PHONE OS 3-3421

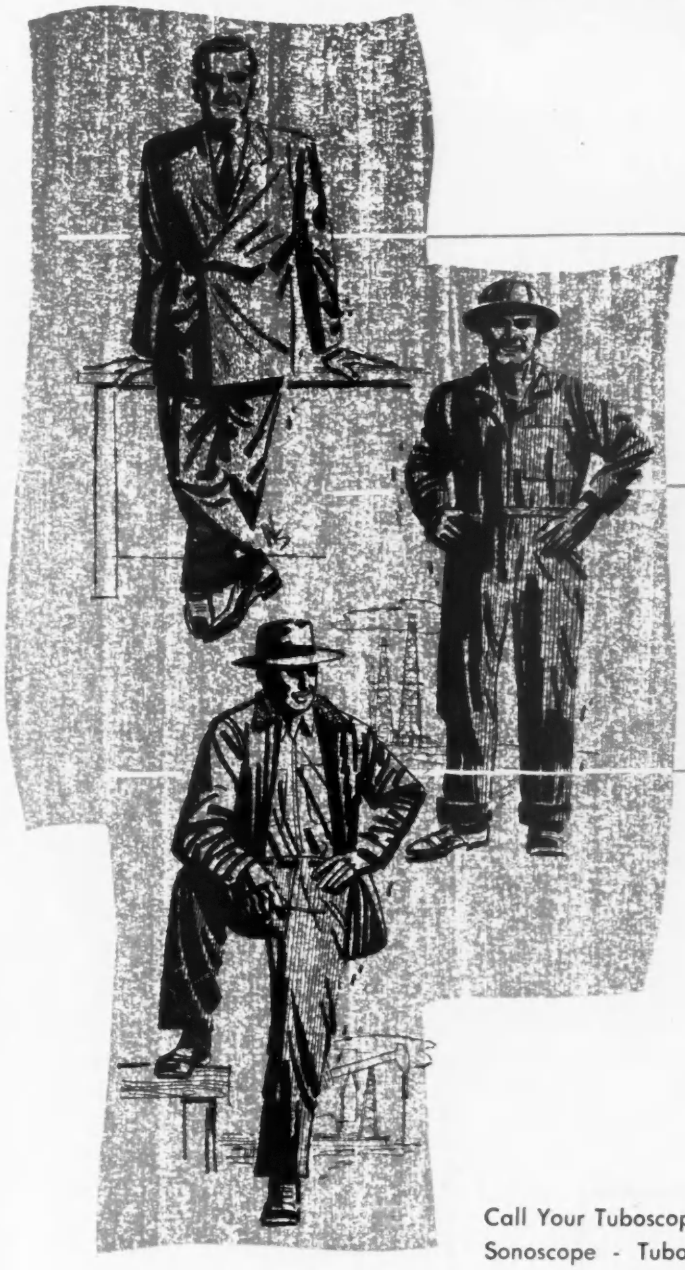
HOUSTON 20, TEXAS

EXPORT: R. S. STOKVIS & SONS, INC.

17 BATTERY PLACE, NEW YORK 4, N. Y.

Which man are you?

here's how *Tuboscope* can help you reduce drilling costs – stop pipe failures – cut production expenses



MANAGEMENT "With Sonoscope inspection we know we're getting full use out of each length of drill pipe. And the more footage we can get from each length the more we save. Then, too, the chance of twist-offs is almost nil, and that means less expense from downtime. Our cost per foot now is actually down from what it used to be, even with the generally rising cost of doing business."

DRILLING "We add on drill collars and then open up on the speed. It's the only way to make time. Drilling fast like that you can't guess at pipe. That's why we Tuboscope our new pipe for mill defects, and of course, Sonoscope our used pipe regularly. It pays off in faster drilling, no downtime for twist-offs and fishing. And I don't get eaten out for being behind schedule. We use Tube-Tectors, too, because they don't move on the pipe."

PRODUCING "We know from our Tuboscope inspection that the tubing and casing are good when they're first run in the hole. They can tell us, too, the exact condition of the inside of the tubing in the well, fast and without killing the well, with caliper surveys. When we do pull tubing we know which lengths to keep and which to scrap. Tuboscope's complete wire line services keep our wells flowing at lowest cost and with least downtime."

Call Your Tuboscope Man Today for the Full Story

Sonoscope - Tuboscope - Tube-Tector Pipe Protectors - Wire Line Services

TUBOSCOPE COMPANY

2400 HOLMES RD. • HOUSTON, TEXAS

Tuboscope

OILFIELD TUBULAR INSPECTION

Sonoscope and Tuboscope are registered U. S. Trade Marks

Colorado Drilling Focused on Denver-Julesburg Basin

The significant Colorado development in 1951 was the comparatively large number of wildcats drilled, mostly in the Denver-Julesburg Basin, in the northeastern quarter of the state.

Drilling and discoveries moved westward in the basin. Leasing moved southward but the wildcats drilled in that direction were disappointing. Wildcats drilled on the eastern side of the basin in Yuma County were failures.

In the westward movement, J. G. Dyer of Denver and others found oil in the D sand at 6700 feet in the old Greasewood pool of Weld County.

The Plains Exploration Company of Denver found Dakota oil at 5290 feet in the Logan area of Logan County. Sinclair Oil & Gas Company found Dakota oil at Sand Creek in the same area. Dakota production was brought in by Shell Oil Company in the Springdale area. The British-American Oil Producing Company had a D sand discovery near 5000 feet at Graylin in Logan County.

In northwestern Colorado, Continental found gas in the Weber sand at 4000 feet near Thornburg in Moffat County, and a Mesa Verde discovery flowing 11 million cubic feet of gas a day was made by Roy Johnson of Ardmore, Okla., in Rio Blanco County's Hells Hole area.

In southwestern Colorado, Stanolind Oil & Gas Company established the Pictured Cliffs as a new pay gas discovery at 2400 feet near Ignacio in the San Juan basin.

Interest High as Activity Quickens in Williston Basin

Williston Basin discoveries in western North Dakota and northeastern Montana were among the most significant in the nation last year and developments in 1952 may be as important.

The first discovery in the basin, which also includes northern South Dakota and parts of Saskatchewan in Canada, was made in the spring by Amerada Petroleum Corporation. Amerada found commercial oil production in the Devonian below 11,000 feet at Beaver Lodge in North Dakota's Williams County.

The discovery prompted brisk leasing in both North Dakota and Montana and it increased as other basin discoveries were made. By the end of the year, an estimated 50 million acres were under lease.

Shell Oil Company found the first Montana production in the Williston in the fall in Dawson County near Richey, 165 miles southwest of the Amerada discovery in North Dakota.

There were other Williston finds in both states and leasing and wildcatting spread to South Dakota. Amerada established production from the Madison formation at 8500 feet in two wildcats in the general vicinity of its North Dakota discovery. C. H. Murphey of El Dorado, Ark., found oil in the Charles at his East Poplar wildcat in Roosevelt County, Montana. The Texas Company established production from the Ordovician on the Baker-Glendive anticline in the southern part of Montana's Dawson County. To the southeast in Wibaux County Shell also found Ordovician oil in its Pine unit wildcat.

While the North Dakota-Montana finds could not be developed sufficiently in the short time since the discoveries to add greatly to the national need for production, they were significant indications of possibilities.

Time will be needed to drill test the extent of production possibilities and the probabilities of reserves.

as nearly as FLANGES can possess the precision cutting of a jewel . . .

HARRISBURG MAKES THEM THAT WAY!

HARRISBURG Drop-Forged Steel Pipe Flanges are manufactured to A.S.A. standards.

SEE OUR CATALOG IN THE COMPOSITE CATALOG

SOUNDS FAR-FETCHED but it isn't, in actuality. Have you examined the *threads* of the Flanges you buy? Threading of Flanges is mighty important, for accurately threaded Flanges give a closer fit and are less likely to work loose.

HARRISBURG FLANGES are finished on specially designed machines to provide threads perfect in height, angle, taper, and gauging. Threaded, slip-on, welding neck, reducing, and other types are available. Order *Harrisburg* next time!

CONTACT THESE DISTRIBUTORS or write Harrisburg direct:

HOUSTON 1	Henry H. Paris, Distributor, Inc.
LOS ANGELES 58	Howard Supply Co.
TULSA 1	W. C. Norris, Manufacturer, Inc.

HARRISBURG STEEL CORPORATION
Harrisburg 8, Pennsylvania

Custom-Built Quality Products in Quantity
99 YEARS IN PENNSYLVANIA'S CAPITAL

DOWN-TO-EARTH *experience..*

SINCE 1932 Independent has had from two to eighteen crews in the field at all times . . . operating from the swamps of Louisiana to the Rocky Mountains, in coastal tidewaters, tropical jungles, and on desert sands.

The down-to-earth experience gained through successfully overcoming special problems and adverse conditions provides the "know how" that gets every job done efficiently and makes Independent's service profitable to our clients. You are invited to consult with us about your exploration program.

D. D. Doty has been working up through the Independent organization for 18 years. Now a senior party chief, his service is typical of the extensive geophysical experience of all key personnel at Independent Exploration Co.

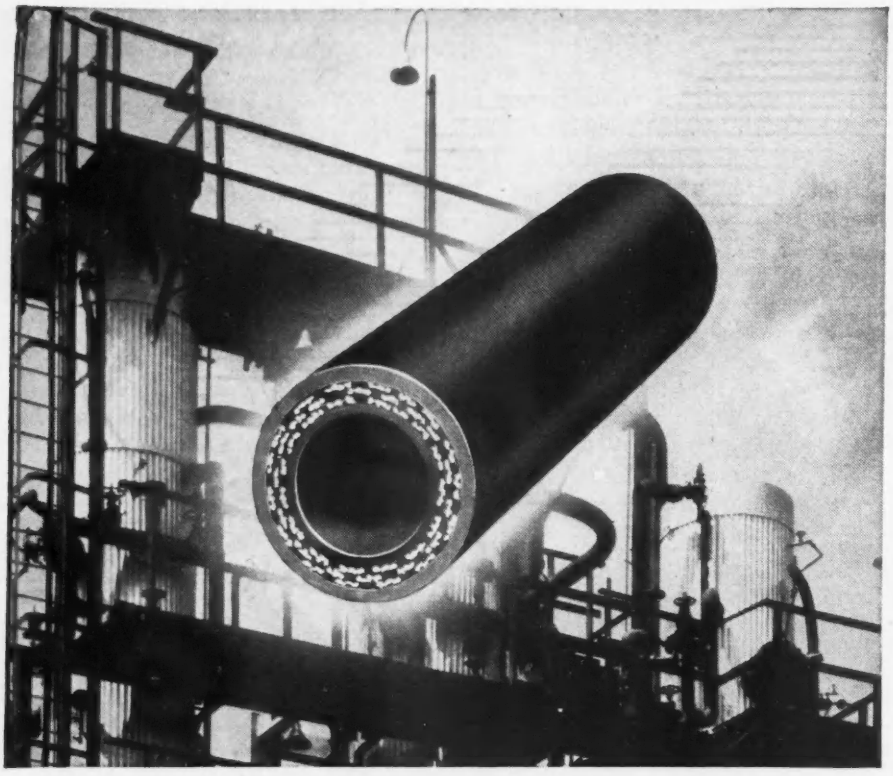
POINTING THE WAY IXC FOR THE DRILL

Independent *Geophysical Surveys*

EXPLORATION COMPANY

1973 WEST GRAY ★ HOUSTON, TEXAS

ESTABLISHED 1932



Turn on the Steam . . .
THIS HOSE CAN TAKE IT!

When you work with steam, high heat and high pressure play havoc with conventional steam hose. It takes a hose *built for the job* to carry saturated steam at temperatures up to 388° and pressures up to 200 lbs. . . . and do it day in and day out without failure!

Hewitt-Robins Monarch® Fiberglas* Steam Hose does just that, under the toughest kind of heavy duty service.

Here's why:

THE TUBE is an exclusive Hewitt-Robins development — a special, heat resisting rubber compound that *stays* soft and flexible without flaking or cracking.

THE CARCASS is made of multiple braids of famous Fiberglas cord—*unsurpassed for heat resistance and strength*—and heavily insulated with heat-resistant rubber. Fiberglas makes this hose kink- and rupture-proof, extremely light, flexible and easy to handle.

THE COVER is extra-tough, extra-thick, won't strip or blister . . . highly resistant to heat, abrasion and weather.

For fire fighting and general steam service in the oil industry, *there's no better hose made.*

Call your Hewitt Rubber Distributor, (listed under "Rubber Products" in the classified 'phone book) or write Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, New York.

HEWITT-ROBINS
FIBERGLAS STEAM HOSE

*T.M. of Owens-Corning Fiberglas Corp.

HEWITT-ROBINS HR **INCORPORATED**

AIR HOSE • BARGE LOADING HOSE • FIRE HOSE • FLOATING ROOF TANK DRAINAGE HOSE
FLUE CLEANING HOSE • FUEL OIL & GASOLINE HOSE • OIL SUCTION & DISCHARGE HOSE
STEAM HOSE • TRUCK TRANSPORT & TANK CAR DISCHARGE-SUCTION HOSE • TANK TRUCK HOSE
WATER HOSE • PROPANE-BUTANE HOSE FOR HANDLING LIQUEFIED PETROLEUM GASES
CONVEYOR BELTING • PIPE SLINGS • RUBBERLOKT® WIRE WHEEL BRUSHES

Western Nebraska

A number of discoveries were made in the western Nebraska portion of the Denver-Julesburg basin in 1951. The Ohio Oil Company, which drilled the discovery well at Gurley in Cheyenne County in 1949, had four discoveries in Cheyenne and Deuel counties.

There will be more development drilling in western Nebraska this year but wildcatting will continue. The wildcatting will continue to probe possibilities to the west of proven areas along the Nebraska-Wyoming boundary and to the north and northwest where several tests were unsuccessful in 1951. Development drilling will be pressed because of prospective new markting outlets, the chief of them the Platte pipe line.

Powder River Basin to Get Major Attention in Wyoming

Wyoming discoveries and developments were not as sensational as those in Montana and North Dakota in 1951 but the state continued as the most important in Rocky Mountain-Great Plains oil production.

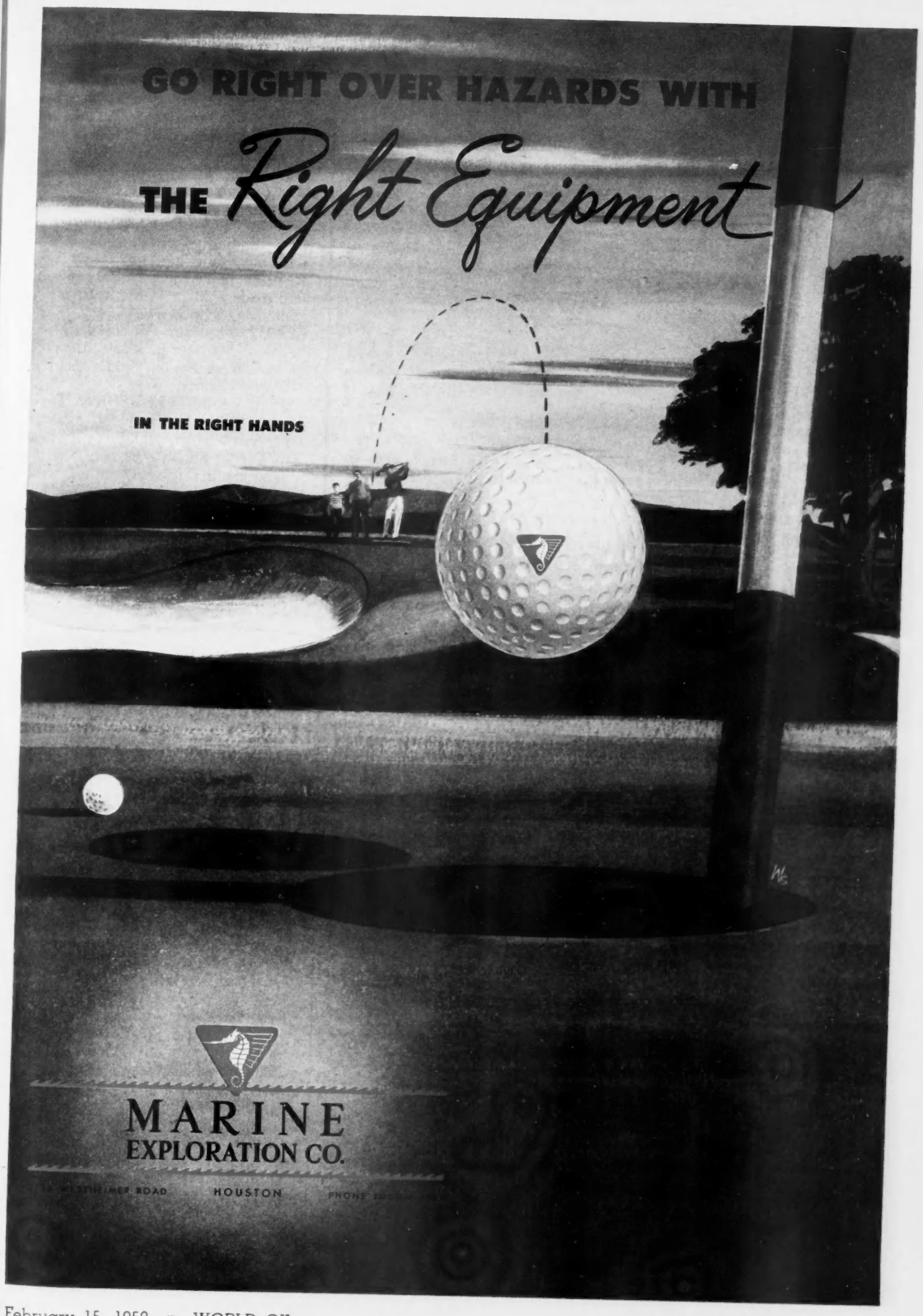
The region's most active drilling program was in the western portion of Wyoming's Powder River basin. Wyoming oil output of around 190,000 barrels a day was considerably more than double that of any other state in the region.

Wyoming's outstanding developments were the discovery of oil in the Tensleep at the Sussex field and at North Fork on the western part of the Powder River basin in Johnson county. The western side and southwestern portion of the basin have been the most active in drilling in the Rocky Mountains for several years and will continue to be so.

Continental Oil company found Tensleep production at Sussex around 8700 feet. Continental and Stanolind Oil & Gas company hit Tensleep success about 6500 feet at North Fork. The finds indicate large Pennsylvanian reserves on the west side of the basin.

Western Powder River discoveries also were made by Sinclair Oil and Gas company at East Salt Creek in Natrona county and by Continental at West Sussex in Johnson county.

Northwestern Wyoming's Big Horn Basin became increasingly important in 1951. The Bonanza oil field in Big Horn county was opened by Bonanza Oil company's 2500-feet Tensleep find. There was subsequent intensive development drilling. General Petroleum corporation figured in two Phosphoria discoveries. One was at


GO RIGHT OVER HAZARDS WITH
THE Right Equipment
IN THE RIGHT HANDS
MARINE
EXPLORATION CO.
HOUSTON

(His business paper . . . of course)

Any man with business on his mind puts his mind on his business paper. The **Best Informed Men in your Field** *find* time to read . . . not just a page or two, but thoroughly. And *regularly*. It pays off in ideas, fresh approaches to tough problems, close touch with new products, new materials, new tools in the market. Read every issue . . . editorials and advertising. Both are jamful of news and "how-to" that will keep *you* one of the **Best Informed Men in your Field,** too.

This business paper in your hand has a plus for you, because it's a member of the Associated Business Publications. It's a *paid*-circulation paper that must *earn* its readership by its quality. And it's one of a leadership group of business papers that work together to add new values, new usefulness, new ways to make the time you give to your business paper *profitable* time.

Throughout the World, the Best Informed Men in the Oil Producing Industry READ

WORLD OIL

A Specialized Petroleum Publication of

GULF PUBLISHING COMPANY

WORLD'S LARGEST OIL INDUSTRY PUBLISHERS

3301 Buffalo Drive

HOUSTON, TEXAS

ABC ABP

One of a series of advertisements prepared by THE ASSOCIATED BUSINESS PUBLICATIONS

10,200 feet at Slick Creek in Washakie County. General and the Pioneer and Mule Creek Oil companies made a 7200-foot Phosphoria discovery near Manderson in Big Horn County. The Frontier was set as a new pay zone at South Elk Basin in Park County by Continental.

Wyoming developments also included discoveries in the Wind River and Green River basins. In the former, The Atlantic Refining company established the Phosphoria as a new pay zone at 11,623 feet near Riverton in Fremont County. Stanolind made a Mesa Verde discovery at 2500 feet near Beaver Creek. Early in 1952, The Pure Oil company was below 16,300 feet in a new deep test at the West Poison Spider field of Natrona County.

In the southwestern Green River Basin, General Petroleum made a 9600-foot Nugget sand discovery near Tip Top in Sublette County.

The rapid rate of Wyoming wildcatting will continue in 1952. The greatest emphasis will be on the western portion of the Powder River Basin with play drawn northward by the Tensleep discoveries at Sussex and North Fork.

Idaho

Phillips Petroleum Company's deep test on the Juniper anticline of Oneida County in the southern Idaho portion of the Basin and Range Province was a failure in 1951.

The only well drilling early in 1952 was a Phillips' wildcat on Horse Shoe Creek in Teton County. The well is in eastern Idaho and east of the Basin and Range Province.

Utah

Utah's top 1951 developments were in the Uintah Basin. At Red Wash in Duchesne County, The California Company discovered oil in the basal Green River formation at 5000-500 feet. At Duchesne in the same county, Continental Oil Company and The Carter Oil company found oil in the same formation but at 9000 feet. Byrd-Frost, Inc., of Dallas found gas at Clear Creek in Carbon County. Shell Oil company found distillate and carbon dioxide in its Bluff unit, San Juan County, in a wildcat not completely evaluated.

There will be considerable wildcatting again in Utah in 1952, especially in the Uintah and San Juan basins. Three tests were underway early in the year in the Millard County section of the Basin and Range Province. Standard Oil Company of California was drilling two of the wildcats and the Gulf Oil Corporation the other.

Drilling Forecast

Is for 1141 More Wells

By WARREN L. BAKER, Editor

DESPITE the handicap of inadequate steel, which will prevent operators from doing as much drilling as they desire, the outlook is for the drilling of more wells, more wildcats and more footage in 1952 than ever before in the U. S.

WORLD OIL forecasts the drilling of 45,967 wells in the U. S. during 1952, an increase of 2.5 percent and 1141 more wells than the record-shattering number competed in 1951. A much sharper gain in footage is predicted, as the trend of drilling an increasing portion of the wells in areas with deeper producing horizons continues. In completing the 45,967 wells, it is estimated 184,688,000 feet of hole will be drilled, a gain of 10,426,282 feet or 6.0 percent over the 174,261,718 feet drilled last year. The forecast is for the completion of 10,684 wildcats, compared with 9705 in 1951. Consequently, wildcats are expected to constitute 23.6 percent of all operations this year in contrast with 21.6 percent last year.

The anticipated 1952 drilling program reflects the very sharp rate of growth experienced in this phase of the industry in recent years. Only during the preceding two years have completions previously exceeded 40,000 wells annually, reaching 43,307 wells in 1950 and 44,826 in 1951. Only three additional years have had more than 35,000 wells completed, these being 1949, 1948 and 1937. The prewar peak was 35,213 wells in 1937.

An even sharper gain has occurred in footage drilled. The anticipated volume in 1952 is one-third greater than the 136¾ million feet drilled as recently as 1948 and is three-fourths larger than the 101 million feet drilled during 1946.

Significant Gain

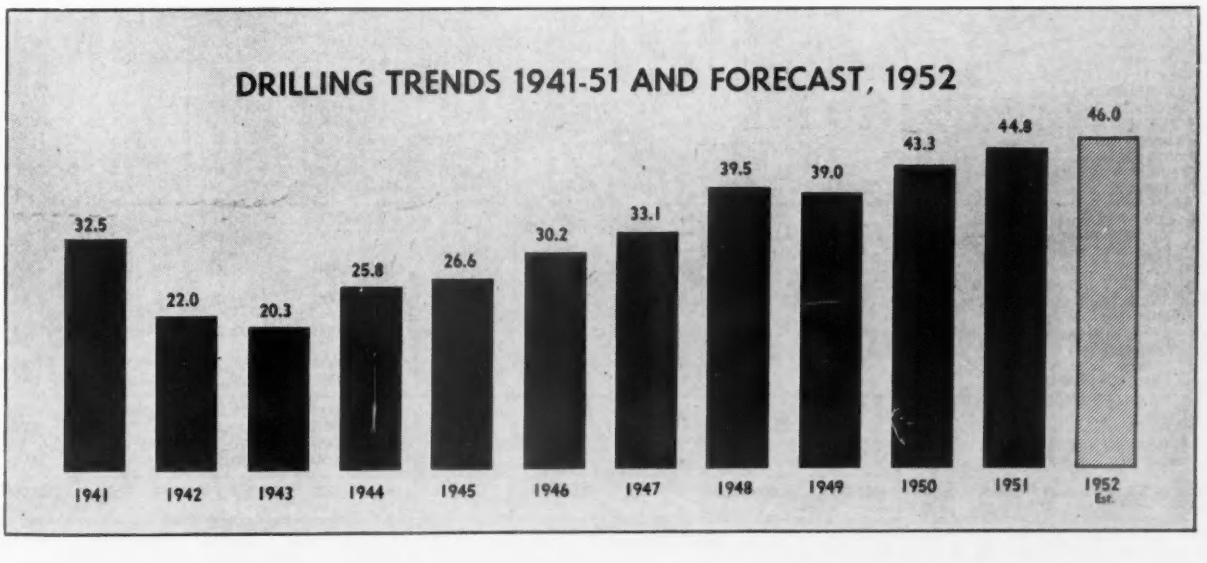
The current shortage of steel makes the gain in footage a very significant development because footage is more directly related to drilling equipment needs than number of wells. Far more equipment, and therefore steel, is required to drill a deep hole than a shallow one.

Neither the estimated footage to be drilled nor the number of wells to be drilled includes any allowance for old wells drilled deeper, but does cover all so-called "new wells," including salt water disposal and water or gas-input wells in addition to wells drilled in search of oil and gas.

The current forecast of drilling activity, like its predecessors over the past 19 years, is based on individual driling plans of numerous oil companies and independent operators adjusted according to current outlook of factors which affect drilling operations.

A year ago WORLD OIL forecast that drilling in 1951 would be at an all-time high, predicting the completion of 44,945 wells. This proved remarkably accurate, as 44,826 wells were actually completed during the year, or only 119 wells and one-fourth of 1 percent less than predicted.

Many factors influence drilling activity. Drilling of development wells following the discovery of new producing fields is always an important consideration, particularly when outstanding strikes like the Spraberry in West Texas, result in an unusually large number of wells drilled. The relative position of demand and supply is another important factor, as is the price of crude and the tax situation. The availability of steel also



enters the picture under present circumstances.

Right now the industry needs to create additional producing ability to keep abreast of recent sharp gains in consumption and have adequate production available for a national emergency. With supply tight, crude prices would advance if not prevented from doing so by government price restrictions. Prices are an extremely important factor because drilling operations invariably rise and fall in accordance with the incentive offered by crude prices.

The foregoing factors have created a strong desire on the part of operators to increase drilling far above predicted record volumes. More than 50,000 wells probably would be drilled in 1952 if enough stee could be procured.

Aside from steel, the only unfavorable development now on the horizon is the possibility that the industry's depletion allowance may be reduced. Should this be done, an immediate reduction in drilling would occur with the result that U. S. producing capacity soon would be inadequate to fulfill requirements.

Texas Gain

Largest increase in number of wells is expected to occur in Texas, where 18,622 wells are forecast, a gain of 806 over 1951 volumes. This means that 40.6 percent of all U. S. drilling is due for this state in contrast with 39.8 percent of all wells completed in 1951. Most active of the Texas areas will be the North-North Central and West-West Central regions which collectively are seen as being the locale for two-thirds of the state's drilling. The completion of 6020 wells is forecast for the North and North Central area (Railroad Commission Districts 9 and 7-B combined), compared with 5783 in 1951. It is anticipated that West and West Central Texas (Railroad Commission Districts 8 and 7-C combined) will see the largest gain in operations, the completion of 5890 wells being forecast for this area, an increase of 744.

With its large number of wells and deeper than average wells, Texas is expected to account for the drilling of 86 million feet of hole in contrast with slightly less than 80 million in 1951. This volume would constitute 46.5 percent of all the footage forecast for the nation.

A large increase is predicted for California, where 2520 wells are forecast in contrast with 2332 in 1951. Kansas is expected to drill 4610 wells, second only to Texas, as compared with 4319 last year. Other states where appreciable gains are anticipated are Colorado, North Dakota, New Mexico and Montana.

Details on the 1952 forecast for number of wells, volume of wildcats, and amount of footage by states, together with a comparison of 1951 rates, appears in the accompanying table.

Indicated Number of Wells and Footage to Be Drilled in 1952

Forecast covers all new wells to be drilled for oil or gas in 1952, salt-water disposal wells, and water or gas-input wells for repressuring and secondary recovery, but does not estimate old wells drilled deeper.

STATE OR DISTRICT	TOTAL NEW WELLS			WILDCAT TESTS		FOOTAGE (New We'ls)			
	Forecast For 1952	Drilled In 1951	Percent Change From 1951	Forecast For 1952	Percent New Wells In 1952	Forecast For 1952	Drilled In 1951	Percent Change From 1951	Percent of U.S. Total 1952
Alabama	20	53	— 62.3	10	50.0	115,000	277,817	— 58.6	0.06
Arizona	7	4	+ 75.0	7	100.0	28,000	8,635	+224.3	0.02
Arkansas	395	428	— 7.7	106	26.8	1,398,000	1,506,651	— 7.2	0.75
California	2,520	2,332	+ 8.1	540	21.4	10,395,000	9,404,216	+ 10.5	5.63
Colorado	405	299	+ 35.5	210	51.9	2,065,000	1,490,587	+ 38.5	1.12
Florida	11	3	+266.6	9	81.8	75,000	20,425	+267.2	0.04
Illinois	2,180	2,396	— 9.0	815	37.4	5,592,000	6,046,374	— 7.5	3.03
Indiana	1,285	1,361	— 5.6	470	36.6	2,390,000	2,488,645	— 4.0	1.29
Kansas	4,610	4,319	+ 6.7	1,035	22.5	15,960,000	14,854,565	+ 7.4	8.64
Kentucky	1,290	1,334	— 3.3	204	15.8	2,722,000	2,748,450	— 1.0	1.47
Louisiana	2,295	2,257	+ 1.7	445	19.4	15,175,000	14,442,347	+ 5.1	8.21
North Louisiana	1,240	1,256	— 1.3	260	21.0	4,836,000	4,849,551	— 0.3	2.62
South Louisiana	1,055	1,001	+ 5.4	185	17.5	10,339,000	9,592,796	+ 7.8	5.60
Maryland	130	44	+195.5	12	9.2	566,000	184,738	+206.4	0.31
Michigan	670	698	— 4.0	335	50.0	1,705,000	1,774,963	— 4.0	0.92
Mississipp[1]	403	392	+ 2.8	195	48.4	2,680,000	2,620,831	+ 2.3	1.45
Missouri	13	11	+ 18.2	10	76.9	13,000	8,747	+ 48.6	0.01
Montana	317	271	+ 17.0	103	32.5	824,000	669,400	+ 23.1	0.45
Nebraska	195	184	+ 6.0	119	61.0	960,000	881,378	+ 8.9	0.52
New Mexico	820	717	+ 14.4	145	17.7	4,346,000	3,632,279	+ 19.6	2.35
New York	510	543	— 6.1	0	0	730,000	775,901	— 5.9	0.41
North Dakota	98	10	+880.0	56	57.1	495,000	50,306	+884.0	0.27
Ohio	870	887	— 1.9	40	4.6	1,849,000	1,858,470	— 0.5	1.00
Oklahoma	5,335	5,467	— 2.4	837	15.7	19,893,000	20,202,046	— 1.5	10.77
Pennsylvania	1,460	1,522	— 4.1	0	0	2,482,000	2,624,961	— 5.5	1.34
South Dakota	5	3	+ 66.7	5	100.0	15,000	8,083	+ 85.6	0.01
Tennessee	10	6	+ 66.7	8	80 0	16,000	7,465	+114.3	0 01
Texas	18,662	17,856	+ 4.5	4,756	25.5	86,004,000	79,778,248	+ 7.8	46.57
Dist. 1—South Central	624	609	+ 2.5	265	42.5	1,735,000	1,761,667	— 1.5	0.94
Dist. 2—Middle Gulf	880	799	+ 10.1	320	36.4	5,377,000	4,751,199	+ 13.2	2.91
Dist. 3—Upper Gulf	1,470	1,542	— 4.7	335	22.8	9,555,000	9,734.649	— 1.9	5.17
Dist. 4—Lower Gulf-S.W.	1,722	1,701	+ 1.2	470	27.3	8,782,000	8,561.182	+ 2.6	4.76
Districts 5 and 6, East Central and Northeast	1,221	1,158	+ 5.4	305	25.0	6,349,000	5 608,398	+ 13.2	3.44
Districts 7-B and 9, North Central and North	6,020	5,783	+ 4.1	2,056	34.2	18,361,000	17,243,477	+ 6.5	9.94
Districts 7-C and 8, West Central and West	5,890	5,383	+ 9.4	945	16.0	33,131,000	29,293.100	+ 13 1	17.94
Dist. 10—Panhandle	835	881	— 5.2	60	7.2	2,714,000	2,824,576	— 3.9	1.47
Utah	78	36	+116.7	44	56.4	440,000	179,445	+145.2	0.24
West Virginia	590	630	— 6.4	7	1.2	1,670,000	1,813.451	— 7.9	0.90
Wyoming	775	759	+ 2.1	153	19.7	4,050,000	3,870,305	+ 4.6	2.19
Other States[1]	8	4	+100.0	8	100.0	35,000	31,989	+ 9.4	0.02
United States Totals	45,967	44,826	+ 2.5	10,684	23.6	184,688,000	174,261,718	+ 6.0	100.00

[1] Other states include Idaho, Nevada, North Carolina, Virginia and Washington.

greater EFFICIENCY on Wilson atlas rigs

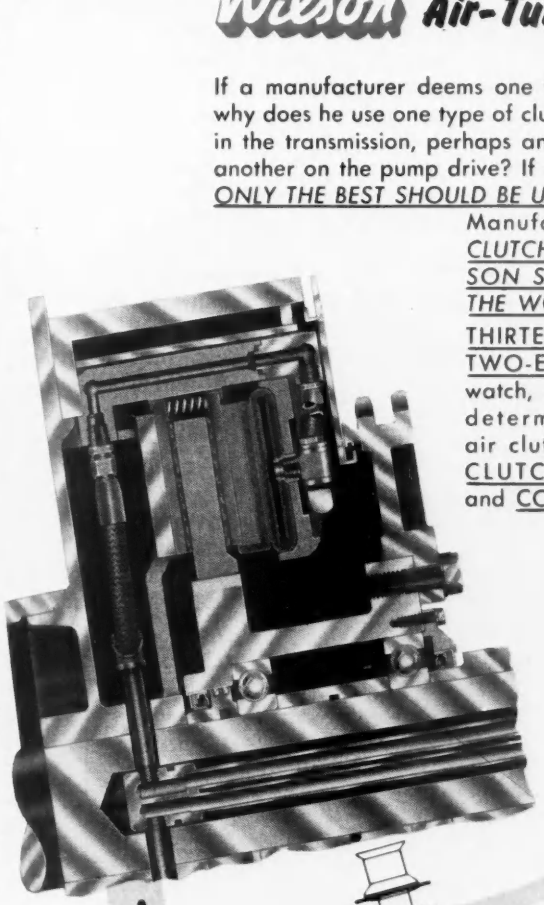
WICHITA Air-Tube disc clutches

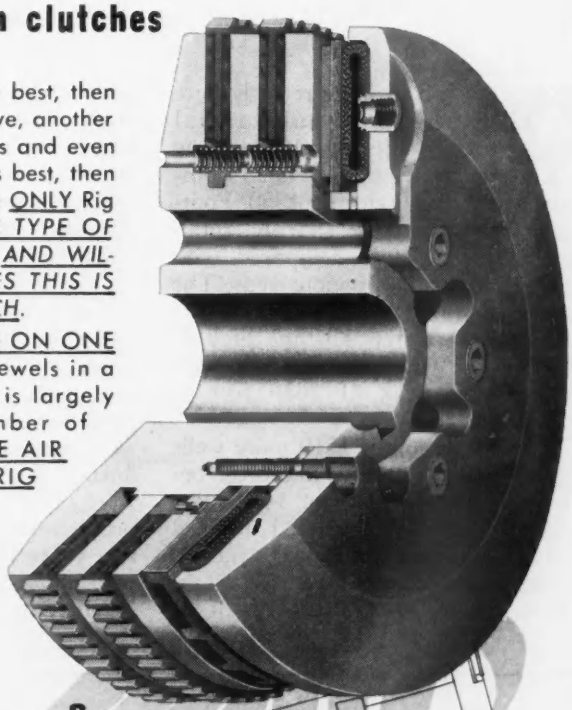
with . . .

Wilson Air-Tube disc drum clutches

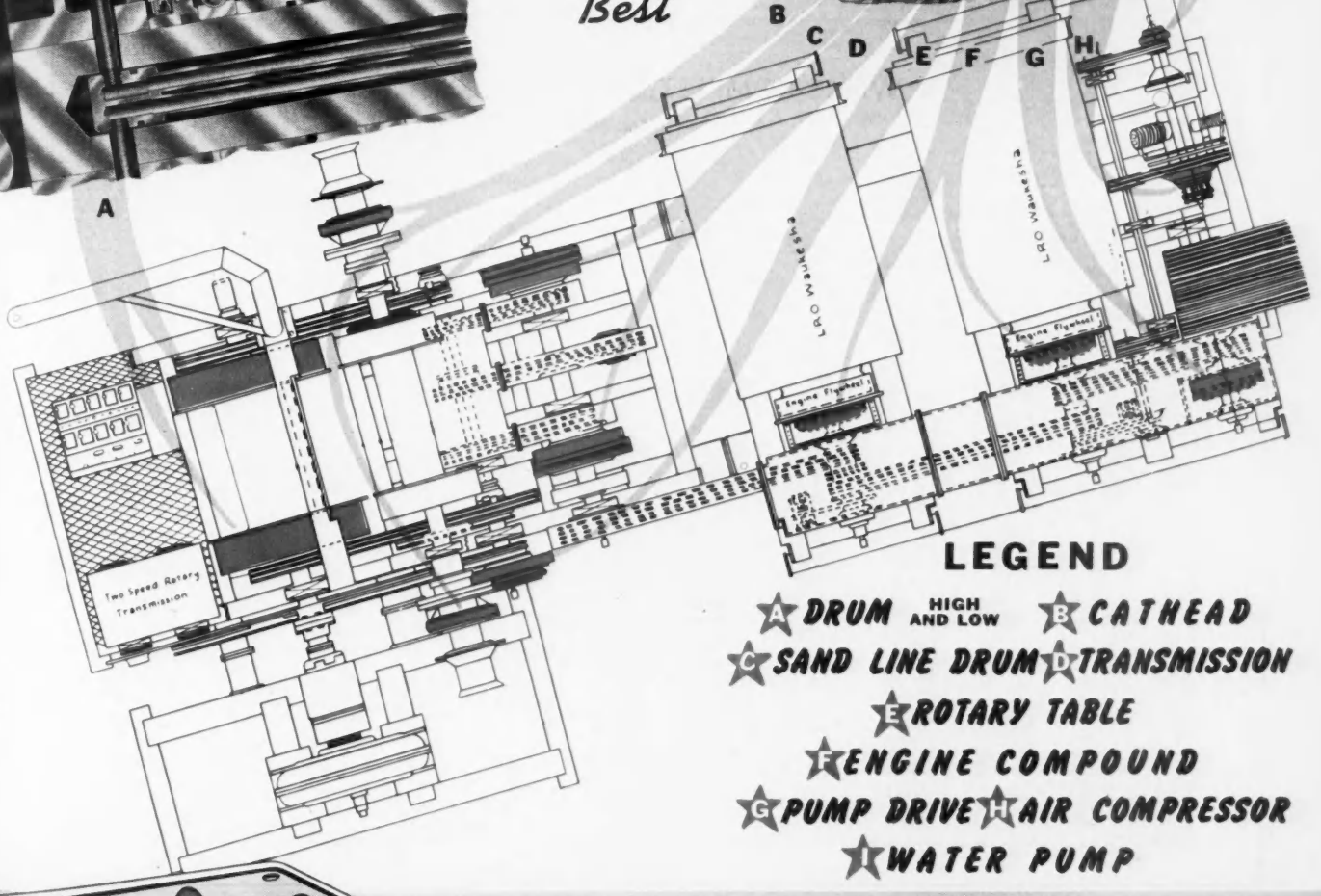
If a manufacturer deems one type of clutch is the best, then why does he use one type of clutch on the drum drive, another in the transmission, perhaps another on the engines and even another on the pump drive? If one type of clutch is best, then *ONLY THE BEST SHOULD BE USED!* WILSON is the ONLY Rig Manufacturer using *ONE TYPE OF CLUTCH ON ALL DRIVES! AND WILSON SINCERELY BELIEVES THIS IS THE WORLD'S BEST CLUTCH.*

THIRTEEN AIR CLUTCHES ON ONE TWO-ENGINE RIG! Like jewels in a watch, the value of a rig is largely determined by the number of air clutches. COUNT THE AIR CLUTCHES ON YOUR RIG and COMPARE!





The World's Best



LEGEND

A DRUM HIGH AND LOW B CATHEAD
C SAND LINE DRUM D TRANSMISSION
E ROTARY TABLE
F ENGINE COMPOUND
G PUMP DRIVE H AIR COMPRESSOR
I WATER PUMP

Wilson

MANUFACTURING CO., Inc.

WICHITA FALLS TEXAS

Completions and Footage

Again Establish New Records

ALL U. S. drilling records were shattered by a substantial margin during 1951. New wells completed totaled 44,826 compared with 43,307 during 1950. Footage drilled rose more sharply, totaling 174,261,718 feet compared with 159,761,732 in the previous year. The increase in footage boosted the average depth to a new all-time high of 3888 feet per well in comparison with the previous peak of 3689 feet in 1950.

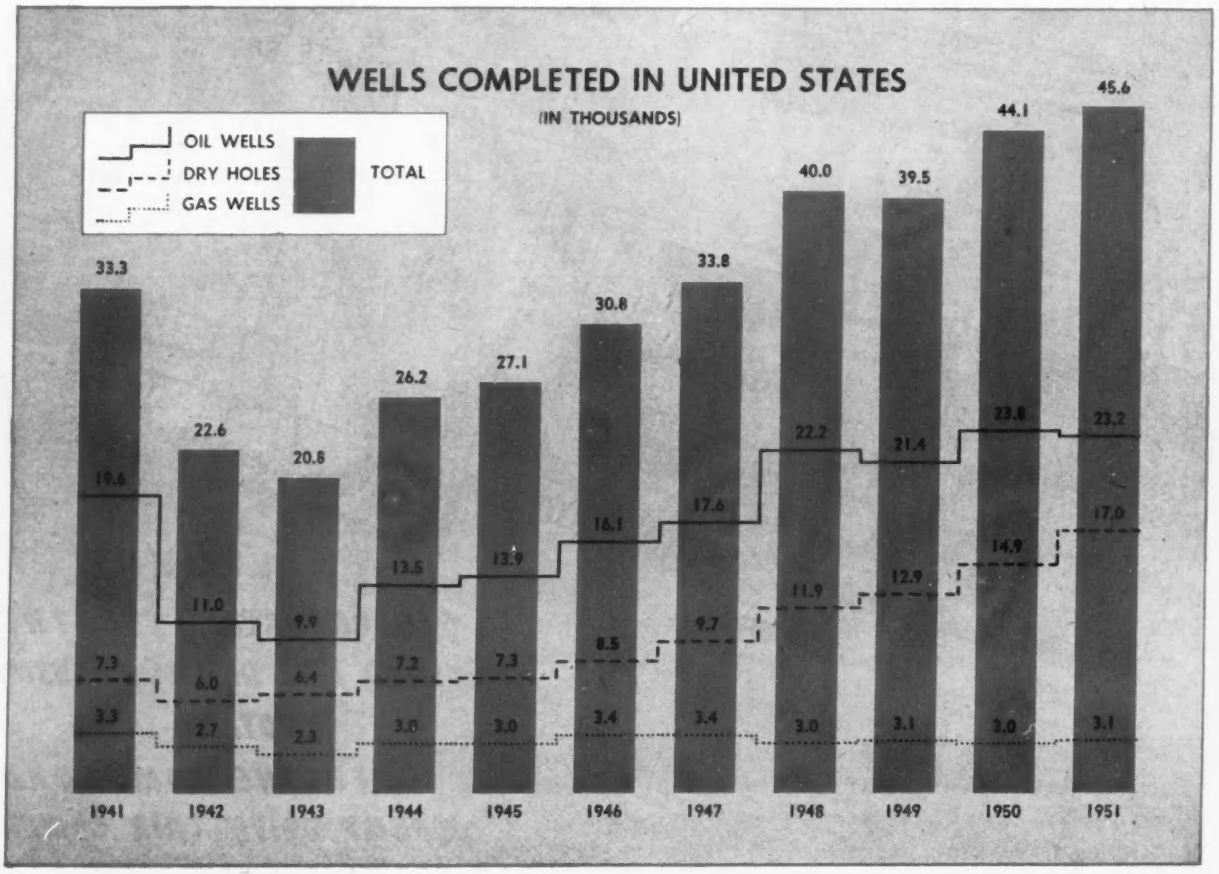
The completion of 1519 more wells was 3.5 percent greater than ever before, while the drilling of 14,499,986 more feet of hole was 9.1 percent greater than the former peak attained in the previous year.

Completions were made up of 67 salt water disposal wells, 1037 water input wells, 79 gas input wells, and 43,643 wells seeking production. Of those wells seeking to find production, 23,179 produced oil, 344 produced distillate, 3094 produced gas, and the remaining 17,026 were dry holes.

Despite the increase in drilling, not as many wells were being drilled per million barrels produced as were completed in prior years. Counting only those wells seeking to find production, 1951 competions represented but 19.4 wells per million barrels produced during the year, whereas 21.4 wells were completed per million barrels of production in 1950. In contrast, prewar years saw the completion in 1937 of 25.3 wells per million barrels of production; 22.9 wells per million barrels produced in 1938; and 21.5 wells per million barrels of production in 1941.

Along with its expanded drilling rate, the industry in recent years has experienced a very sharp growth in number of dry holes completed. This has greatly intensified the industry's financial burden of finding additional quantities of new oil. The 17,026 dry holes finished last year was in contrast with 14,918 in 1950, and was double the number drilled as recently as 1946.

The sharp gain in dry holes drilled caused a steady growth in the relation of non-productive tests to overall drilling. Whereas dry holes accounted for only 20 percent of all wells drilled in search of production



in 1937, and but 24.1 percent in 1941, they constituted 39 percent of these completions in 1951. In contrast, only 35.4 percent of the wells were dry holes in 1950, but 34.1 percent in 1949, and 31.9 percent in 1948.

Consequently, the industry now drills a much greater number of dry holes for every million barrels it produces. Whereas prior to the war the industry was drilling a little over five failures for every million barrels of production, this figure reached 7½ dry holes per million barrels produced in both 1951 and 1950.

The increase in footage drilled has been phenomenal. The nearly 175 million feet drilled in 1951 compared with 159.7 million feet in 1950, with 138.6 million feet in 1949, and with 136.7 in 1948. All other years had much smaller figures for footage drilled. The increase in footage reflects not only the drilling of wells to greater depths but also the concentration of a greater portion of the drilling in areas which have deeper producing formations. The four leading producing states (Texas, California, Louisiana and Oklahoma), all with greater than average depths, accounted for 62.3 percent of the completions in 1951 although being responsible for only 60.5 percent of the wells completed in 1950.

200 Feet Deeper

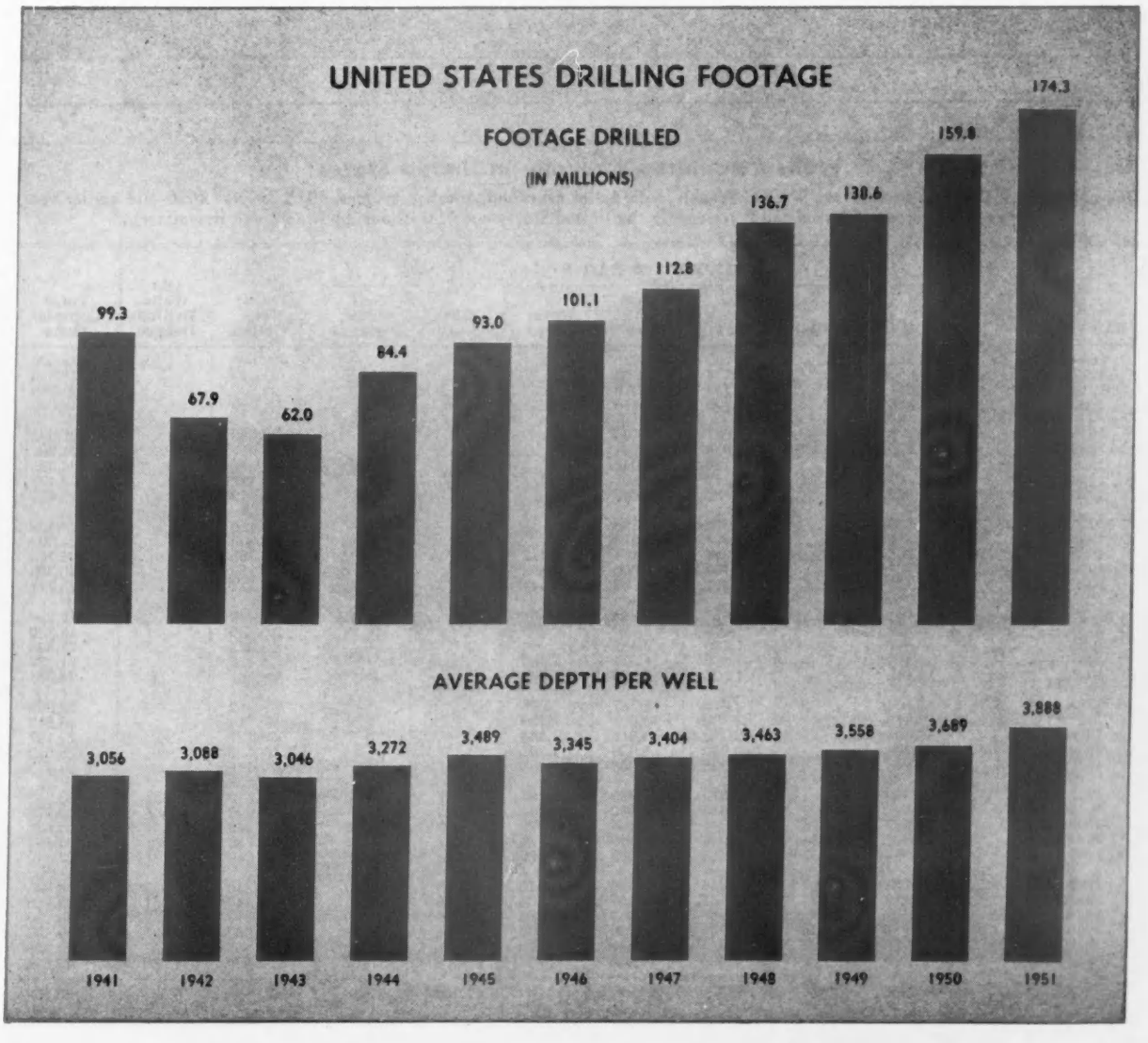
With footage drilled being equal to 3888 feet per well in 1951, wells as an average were drilled approximately 200 feet deper than in 1950, about 300 feet deeper than in 1949, and 400 feet greater than in 1948.

Texas accounted for much of the increase in drilling operations during 1951, its 17,856 completions having been 1099 more than in 1950. The 79,778,248 feet of hole drilled in the state exceeded its 1950 footage by more than 7 million. North Central and West Central areas were largely responsible for Texas' big gain in wells completed last year. Completion of 2810 wells in North Central was 925 more than in 1950, while the 1532 finished in West Central was 607 greater than in the previous year. West Texas remained the state's most active region, although completions dropped from 4129 in 1950 to 3851 in 1951.

California and Kansas were other states to record particularly large gains in the number of wells completed. California completed 2332 wells, up 541. Kansas drilled 4319, a gain of 321. The 5467 wells completed in Oklahoma were 241 more than in 1950.

Other states to complete 100 or more wells than in 1950 were Colorado, New Mexico and Wyoming.

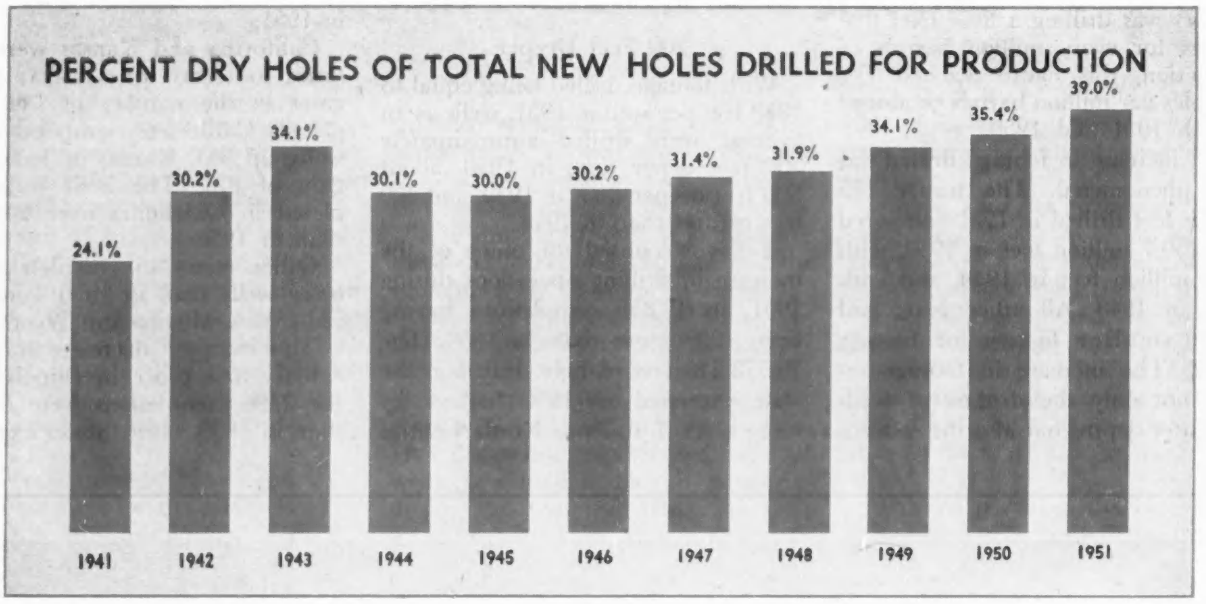
The sharpest decrease in drilling activity took place in Illinois, where the 2396 completions were 514 less than in 1950. Other states experienc-



ing sizeable declines in drilling were Indiana, Louisiana, Michigan, New York, Ohio and Pennsylvania.

Although Texas led in total footage drilled due to its great number of wells, Mississippi had the largest average depth per well among the more active states. Mississippi's completions in 1951 had an average depth of 6686 feet per well. Louisiana followed with an average depth of 6399 per well, with footage in its South or Gulf Coast region equaling 9583 feet per well. Wyoming ranked third in average depth per well with a record of 5099 feet, and New Mexico was fourth with 5066 feet per well.

Several states with only a small amount of drilling exceeded the foregoing average depths, due to the completion of deep wildcats.



Wells Completed Annually in United States

(Source: WORLD OIL and predecessor, The Oil Weekly, with aid of other authoritative sources, 1921 to now; 1920 and earlier years from U. S. Bureau of Mines and Petroleum in the United States and Possessions, by Arnold and Kemnitzer)

YEAR	NEW WELLS							Total New Wells	Old Wells Drilled Deeper	Total Completions
	Oil	Distillate	Gas	Dry	Water Input	Gas Injection	Salt Water Disposal			
1859-1917	380,502	....	20,183	91,821	.....	....	....	492,506	....	492,506
1918	17,860	....	2,324	5,629	.....	....	....	25,813	....	25,813
1919	21,041	....	2,153	6,075	.....	....	....	29,269	....	29,269
1920	24,278	....	2,275	7,476	.....	....	....	34,029	....	34,029
1921	14,715	....	2,081	5,193	.....	....	....	21,989	....	21,989
1922	17,790	....	1,926	5,191	.....	....	....	24,907	....	24,907
1923	16,182	....	2,140	6,043	.....	....	....	24,365	....	24,365
1924	14,707	....	2,172	5,591	.....	....	....	22,470	....	22,470
1925	17,029	....	2,536	6,847	.....	....	....	26,412	....	26,412
1926	18,626	....	2,502	8,328	.....	....	....	29,456	....	29,456
1927	14,382	....	2,494	7,213	.....	....	....	24,089	....	24,089
1928	12,505	....	2,754	7,164	2,342	....	....	24,765	....	24,765
1929	15,758	....	3,107	7,600	3,898	....	....	30,363	....	30,363
1930	12,133	....	2,971	6,163	2,444	....	....	23,711	....	23,711
1931	7,061	....	2,067	3,264	567	....	....	12,959	....	12,959
1932	10,569	....	1,079	3,389	799	....	....	15,836	....	15,836
1933	7,887	....	1,190	3,492	954	....	....	13,523	....	13,523
1934	13,119	....	1,496	4,811	1,696	....	....	21,122	....	21,122
1935	15,418	....	1,802	5,696	1,665	....	....	24,581	....	24,581
1936	18,704	....	2,375	5,787	2,096	....	....	28,962	....	28,962
1937	23,115	....	2,732	6,627	2,739	....	....	35,213	....	35,213
1938	19,106	....	2,143	6,515	1,363	....	....	29,127	....	29,127
1939	17,734	....	2,030	6,890	1,358	....	....	28,012	....	28,012
1940	19,843	....	2,265	7,053	1,988	....	....	31,149	....	31,499
1941	19,590	....	3,279	7,280	2,197	117	47	32,510	822	33,332
1942	10,977	105	2,685	5,962	2,141	73	47	21,990	588	22,578
1943	9,887	76	2,314	6,364	1,576	90	42	20,349	471	20,820
1944	13,502	54	3,024	7,153	1,784	218	51	25,786	377	26,163
1945	13,944	153	3,039	7,346	1,796	329	42	26,649	491	27,140
1946	16,087	207	3,355	8,496	1,816	219	50	30,230	615	30,845
1947	17,613	283	3,437	9,751	1,861	156	46	33,147	651	33,798
1948	22,197	346	2,966	11,939	1,885	84	60	39,477	533	40,010
1949	21,415	378	3,121	12,898	1,036	56	58	38,962	535	39,497
1950	23,775	465	3,015	14,918	993	38	103	43,307	751	44,058
*1951	23,179	344	3,094	17,026	1,037	79	67	44,826	758	45,584
Total	942,230	2,411	104,126	338,991	42,031	1,459	613	1,431,861	6,592	1,438,453

* Data for 1951 subject to slight revision.

REAL PERSONAL SERVICE

one of many reasons why
HALLIBURTON'S *best*
...for your DRILL STEM TEST!

YOUR TESTER stays on the rig from start to finish when Halliburton tests your well. This highly important operation requires close, full-time, personal attention, and no one is more aware of it than your Halliburton Tester.

He comes fully prepared and equipped to give you a safe, successful, accurate test. He'll do it at a big saving of rigtime for you. The Halliburton Tester is handpicked from a field of high-caliber men for his extraordinary responsibility, efficiency, and capability. Then he is carefully and thoroughly trained on every type of well until he has earned the coveted title of Testing Specialist. This exhaustive training enables him to handle your test no matter how deep the well, how high the pressures or temperatures.

This equipment is the most advanced and specialized in the industry. It was developed by 25 years' grass roots research and improved by service on more than a million wells. The Tester understands every function of these tools. He is particularly proud of the many features that Halliburton *alone* offers – such as the Bourdon Tube Pressure Recording Device, the curved J slots, and automatic locks.

Halliburton has over a hundred Testing Specialists who give real personal service. One of them is only minutes away from you and ready to go as soon as you call. Phone him and he'll have his string made up before you come out of the hole. Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

MORE REASONS WHY HALLIBURTON'S best:

25 YEARS RESEARCH BACKS UP YOUR TEST

Halliburton *alone* offers a testing service developed and improved by 25 years of energetic, grass roots research.

MOST ADVANCED TOOLS AND TECHNOLOGY

Halliburton's highly specialized tools and exclusive features, its superior knowledge and experience, help make misruns a rarity.

GREATER ACCURACY IN PRESSURE RECORDING

The Bourdon Tube Pressure Recording Device, exclusive with Halliburton, gives you far greater accuracy at no extra cost.

HALLIBURTON

YEARS AHEAD IN DRILL STEM TESTING!

STATE or DISTRICT	OIL			DISTILLATE			GAS			DRY			WATER INPUT			GAS INPUT		
	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth
Alabama	17	75,497	4,441							36	202,320	5,620						
Arizona										4	8,635	2,159						
Arkansas	235	756,822	3,221	1	7,401	7,401	12	44,338	3,695	180	698,090	3,878						
California	1,678	6,861,979	4,089				35	146,820	4,195	613	2,368,736	3,864	4	11,940	2,985			
Colorado	113	580,684	5,139				18	89,837	4,991	168	820,066	4,881						
Florida										3	20,425	6,808						
Idaho										1	12,844	12,844						
Illinois	917	2,334,038	2,545				8	8,130	1,016	1,459	3,682,894	2,524	11	18,991	1,726			
Indiana	453	844,399	1,864				20	23,010	1,151	885	1,615,304	1,825	2	4,088	2,044			
Kansas	2,105	7,202,628	3,422	1	6,126	6,126	358	981,429	2,741	1,819	6,529,154	3,589	1	2,854	2,854			
Kentucky	501	972,788	1,942				230	498,267	2,166	597	1,269,207	2,126	3	3,656	1,219			
Louisiana	1,106	6,568,972	5,939	130	1,312,010	10,092	162	877,096	5,414	857	5,662,145	6,607	1	11,325	11,325			
North Louisiana	598	1,714,286	2,867	49	422,561	8,624	120	448,760	3,740	489	2,263,944	4,630						
South Louisiana	508	4,854,686	9,556	81	889,449	10,981	42	428,336	10,198	368	3,398,201	9,234	1	11,325	11,325			
Maryland							26	100,288	5,014	18	84,450	4,692						
Michigan	226	674,810	2,986				21	38,482	1,832	451	1,061,671	2,354						
Mississippi	124	749,051	6,041	11	89,138	8,103	14	102,106	7,293	243	1,680,536	6,916						
Missouri							2	411	206	9	8,336	926						
Montana	145	329,065	2,269				15	33,093	2,206	107	295,413	2,761	4	11,829	2,957			
Nebraska	52	261,600	5,031	1	4,695	4,695	12	45,157	3,763	119	569,926	4,789						
Nevada										2	15,431	7,716						
New Mexico	363	2,149,820	5,922	1	7,170	7,170	190	711,356	3,744	163	763,933	4,687						
New York	317	448,731	1,416										226	327,170	1,448			
North Dakota	1	11,955	11,955							9	38,351	4,261						
Ohio	322	618,933	1,922				228	534,402	2,344	335	702,161	2,096				2	2,974	1,487
Oklahoma	2,995	12,046,819	4,022	11	98,153	8,923	249	771,373	3,098	2,032	6,902,087	3,397	152	324,693	2,136	9	13,584	1,509
Pennsylvania	634	1,017,714	1,605				179	434,094	2,425	64	139,218	2,175	585	937,755	1,603	60	96,180	1,603
South Dakota										3	8,083	2,694						
Tennessee										6	7,465	1,244						
Texas	10,313	47,947,492	4,649	188	1,591,285	8,464	882	4,012,612	4,549	6,412	26,089,559	4,069	48	94,270	1,964	8	34,731	4,341
Dist. 1: South Central	301	792,848	2,634	1	7,450	7,450	12	60,562	5,047	295	900,807	3,054						
Dist. 2: Middle Gulf	299	1,806,650	6,042	45	367,485	8,166	108	554,411	5,133	346	2,014,153	5,821				1	8,500	8,500
Dist. 3: Upper Gulf	868	5,009,828	5,772	50	485,838	9,717	107	748,736	6,998	516	3,482,980	6,750				1	7,267	7,267
Dist. 4: Lower Gulf-SW	867	4,174,760	4,815	50	408,400	8,168	121	736,831	6,090	654	2,217,281	4,919	7	15,610	2,230	1	7,621	7,621
Dist. 5: Feast Central	220	1,218,716	5,540	3	26,734	8,911	8	54,075	6,759	241	733,238	3,042						
Dist. 6: Northeast	445	2,126,778	4,779	25	183,006	7,320	46	312,128	6,785	170	953,723	5,610						
Dist. 7-B: North Central	1,237	3,626,374	2,932				53	143,787	2,713	1,512	4,427,024	2,928	6	5,382	897			
Dist. 7-C: West Central	1,020	5,211,271	5,109	10	89,099	8,910	12	50,122	4,177	490	2,102,898	4,292						
Dist. 8: West	3,200	18,034,603	5,636				17	86,778	5,105	629	3,702,479	5,886	5	15,850	3,170			
Dist. 9: North	1,502	4,859,511	3,235	4	23,273	5,818	18	84,619	4,701	1,412	3,997,116	2,831	30	57,428	1,914	5	11,343	2,269
Dist. 10: Panhandle	354	1,086,153	3,068				380	1,180,563	3,107	147	577,860	3,795						
Utah	7	41,640	5,949				1	4,761	4,761	28	133,044	4,752						
Washington	1	3,714	3,714															
West Virginia	93	200,935	2,161				415	1,289,391	3,107	122	323,125	2,649						
Wyoming	461	2,406,318	5,220				17	83,797	4,929	281	1,380,190	4,912						
Total United States	23,179	95,106,404	4,013	344	3,115,978	9,058	3,094	10,830,250	3,500	17,026	63,092,799	3,706	1,037	1,748,571	1,686	79	147,469	1,867

STATE or DISTRICT	SALT WATER DISPOSAL			TOTAL NEW WELLS (Preceding Classes)						OLD WELLS DRILLED DEEPER 1951 (Productive and Dry)			TOTAL ALL WELLS					
				1951			1950						1951			1950		
	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth	Wells	Footage	Avge. Depth
Alabama				53	277,817	5,242	45	198,313	4,407	2	350	175	55	278,167	5,058	46	198,788	4,321
Arizona				4	8,635	2,159	7	30,614	4,373				4	8,635	2,159	8	32,108	4,014
Arkansas				428	1,506,651	3,520	397	1,327,747	3,344	4	3,310	828	432	1,509,961	3,495	399	1,329,236	3,331
California	2	14,741	7,371	2,332	9,404,216	4,033	1,791	7,655,668	4,275	119	81,924	688	2,451	9,486,140	3,870	1,922	7,748,767	4,032
Colorado				299	1,490,587	4,985	87	390,713	4,491	8	16,140	2,018	307	1,506,727	4,908	92	393,734	4,280
Florida				3	20,425	6,808	11	69,518	6,320	1	1,684	1,684	4	22,109	5,527	11	69,518	6,320
Georgia							4	13,464	3,366							4	13,464	3,366
Idaho				1	12,844	12,844	5	16,367	3,273				1	12,844	12,844	5	16,367	3,293
Illinois	1	2,321	2,321	2,396	6,046,374	2,524	2,910	6,408,293	2,202				2,396	6,046,374	2,524	2,911	6,408,333	2,201
Indiana	1	1,844	1,844	1,361	2,488,645	1,829	1,547	2,669,132	1,725	11	3,223	293	1,372	2,491,868	1,816	1,555	2,670,956	1,718
Iowa							1	2,505	2,505							1	2,505	2,505
Kansas	35	132,374	3,782	4,319	14,854,565	3,439	3,998	12,907,790	3,229				4,319	14,854,565	3,439	4,003	12,912,421	3,226
Kentucky	3	4,532	1,511	1,334	2,748,450	2,060	1,263	2,236,350	1,771	2	117	59	1,336	2,748,567	2,057	1,265	2,236,604	1,768
Louisiana	1	10,799	10,799	2,257	14,442,347	6,399	2,444	14,789,620	6,051	16	39,755	2,485	2,273	14,482,102	6,371	2,464	14,815,786	6,013
North Louisiana				1,256	4,849,551	3,861	1,311	4,674,257	3,565	7	20,267	2,895	1,263	4,869,818	3,856	1,318	4,680,816	3,551
South Louisiana	1	10,799	10,799	1,001	9,592,796	9,583	1,133	10,115,363	8,928	9	19,488	2,165	1,010	9,612,284	9,517	1,146	10,134,970	8,884
Maryland				44	184,738	4,199	4	16,636	4,159				44	184,738	4,199	4	16,636	4,159
Michigan				698	1,774,963	2,543	829	2,050,324	2,473	1	809	809	699	1,775,772	2,540	834	2,055,240	2,464
Mississippi				392	2,620,831	6,686	322	2,330,060	7,236	3	3,110	1,037	395	2,623,941	6,643	325	2,334,451	7,183
Missouri				11	8,747	795	27	21,482	796				11	8,747	795	27	21,482	796
Montana				271	669,400	2,470	268	667,798	2,492	7	5,215	745	278	674,615	2,427	269	667,933	2,483
Nebraska				184	881,378	4,790	107	464,024	4,337				184	881,378	4,790	108	464,141	4,298
Nevada				2	15,431	7,716	2	14,439	7,219				2	15,431	7,716	2	14,439	7,219
New Mexico				717	3,632,279	5,066	593	2,666,843	4,497	16	38,593	2,412	733	3,670,872	5,008	613	2,697,902	4,401
New York				543	775,901	1,429	700	997,685	1,425				543	775,901	1,429	700	997,685	1,425
North Carolina							2	2,442	1,471							2	2,942	1,471
North Dakota				10	50,306	5,031	3	27,062	9,021				10	50,306	5,031	3	27,062	9,021
Ohio				887	1,858,470	2,095	970	2,037,400	2,100	29	18,964	654	916	1,877,434	2,050	992	2,052,948	2,070
Oklahoma	19	45,337	2,386	5,467	20,202,046	3,695	5,226	18,973,152	3,631	155	126,741	818	5,622	20,328,787	3,616	5,363	19,071,211	3,556
Oregon							4	12,954	3,239							4	12,954	3,239
Pennsylvania				1,522	2,624,961	1,725	1,689	3,304,762	1,957	29	30,566	1,054	1,551	2,655,527	1,712	1,721	3,337,242	1,939
South Carolina							2	1,030	515							2	1,030	515
South Dakota				3	8,083	2,694	7	22,540	3,220				3	8,083	2,694	7	22,540	3,220
Tennessee				6	7,465	1,244	30	31,207	1,040				6	7,465	1,244	30	31,207	1,040
Texas	5	8,299	1,660	17,856	79,778,248	4,468	16,757	72,632,513	4,334	330	249,588	756	18,186	80,027,836	4,401	17,079	72,883,603	4,267
Dist. 1: South Central				609	1,761,667	2,893	509	1,551,002	3,047	33	11,370	345	642	1,773,037	2,762	527	1,556,084	2,953
Dist. 2: Middle Gulf				799	4,751,199	5,946	689	4,004,859	5,813	11	29,552	2,687	810	4,780,751	5,902	698	4,014,447	5,751
Dist. 3: Upper Gulf				1,542	9,734,649	6,313	1,591	9,552,040	6,004	10	22,544	2,254	1,552	9,757,193	6,287	1,604	9,583,314	5,975
Dist. 4: L. Gulf-SW	1	679	679	1,701	8,561,182	5,033	1,660	8,103,934	4,882	22	40,188	1,827	1,723	8,601,370	4,992	1,686	8,135,755	4,825
Dist. 5: East Central				472	2,032,763	4,307	206	919,165	4,462	7	6,420	917	479	2,039,183	4,257	207	919,263	4,441
Dist. 6: Northeast				686	3,575,635	5,212	715	3,436,503	4,806	1	3,353	3,353	687	3,578,988	5,210	718	3,450,550	4,806
Dist. 7-B: N. Central	2	5,240	2,710	2,810	8,207,987	2,921	2,085	5,752,302	2,759	22	26,912	1,223	2,832	8,234,899	2,908	2,114	5,780,928	2,735
Dist. 7-C: West Cent.				1,532	7,453,390	4,865	925	3,887,076	4,202	30	10,715	357	1,562	7,464,105	4,779	982	3,896,357	3,968
Dist. 8: West				3,851	21,839,710	5,671	4,129	23,007,476	5,572	165	73,114	443	4,016	21,912,824	5,456	4,276	23,118,694	5,407
Dist. 9: North	2	2,200	1,100	2,973	9,035,490	3,039	3,190	9,096,332	2,852	28	22,625	808	3,001	9,058,115	3,018	3,209	9,106,387	2,838
Dist. 10: Panhandle				881	2,824,576	3,206	1,058	3,321,824	3,140	1	2,795	2,795	882	2,827,371	3,206	1,058	3,321,824	3,140
Utah				36	179,445	4,985	24	83,875	3,495	1	1,263	1,263	37	180,708	4,884	24	83,875	3,495
Virginia							27	122,167	4,525							27	122,167	4,525
Washington				1	3,714	3,714	3	19,522	6,507				1	3,714	3,714	3	19,522	6,507
West Virginia				630	1,813,451	2,878	607	1,604,643	2,644	12	14,198	1,183	642	1,827,649	2,847	633	1,633,884	2,581
Wyoming				759	3,870,305	5,099	594	2,940,578	4,950	12	16,575	1,381	771	3,886,880	5,041	600	2,948,340	4,914
Total United States	67	220,247	3,247	44,826	174,261,718	3,888	43,307	159,761,732	3,689	758	652,125	860	45,584	174,913,843	3,837	44,058	160,369,023	3,640

IT TAKES MORE THAN MUSCLE

Watching an athlete top a sports record, you feel a glow of admiration for the high degree of control and coordination which he has over his well trained muscles. And in oil well casing perforating, the same as in sports, it is the effectiveness of the techniques developed and the skill in applying them that get results. Welex Jet perforating, unlike the older methods which it is replacing, is not a method of violently upsetting an assembly in the well to permit the entry of oil. Rather it is *formation* perforating, which produces *through an intact assembly* with *positive hole density per foot* and *known penetration.* Results cost less with Welex Jets. Call your nearest Welex Station for prompt service day or night.

ORIGINATORS OF Welex JET PERFORATING

Welex
JET SERVICES INC.

GENERAL OFFICE: 3909 Hemphill Street • Fort Worth 9, Texas
FIELD STATIONS: Ardmore • Lindsay • Shawnee • Corpus Christi
Falfurrias • Houston • Kilgore • Odessa • Wichita Falls • Hobbs

Rigs in Operation

Average 7.2 Percent Increase

DRILLING rigs in operation in in the U. S. during 1951 averaged a 7.2 percent gain over the previous year for the second best record in the industry's history.

The average number of rigs, cable and rotary combined, operated in 1951 was 4844. This compared with 4517 in 1950; 4290 in 1949; 4950 in the record year 1948; and 4738 in 1947.

Rigs in operation during the past year topped the number in use during 1950 for every corresponding month, and during four successive months the total went over the 5000 mark for the first time since 1948. During three of these months—September, October and November—there were more rigs in operation than in any previous month on record. Busiest month was October, when 5260 rigs were in operation—a figure that compares with 5229 in October, 1948, the next best month before 1951 began.

Rig activity showed the usual seasonal pattern of a slow start, with intensified operations in subsequent months. Beginning with 4275 active rigs in January, the number increased each month until June. The climb was resumed in September and did not taper off again until December. During the last four months there were more active rigs than in any corresponding month in history.

The 7.2 percent gain in active rigs had a parallel in a gain in footage. There were 174,261,718 feet of hole

U. S. Drilling Rigs in Use During 1951, by States, by Months

Figures are for end of month, and include rigs drilling, rigging up, and temporarily shut down.

	1950		1951											
STATE or DISTRICT	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Alabama	8	8	6	6	9	3	3	3	4	5	4	4	4	4
Arizona	3	3	3	3	....	....	2	....	2	2	....	....	2	2
Arkansas	37	30	27	30	25	24	31	29	35	35	37	37	36	33
California	192	207	206	227	220	229	247	201	253	236	277	271	275	274
Colorado	25	25	18	17	26	24	27	31	30	40	42	44	47	41
Florida	1	1	1	1	....	....	1	2	1	....	1	1	2	1
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Idaho	1	1	1	....	....	....	....	....	....	1	1	1	1	1
Illinois	250	246	189	155	172	195	222	207	214	201	217	201	228	189
Indiana	194	217	190	202	190	167	170	174	176	187	189	182	184	172
Kansas	333	337	340	341	366	433	409	427	439	422	408	434	433	389
Kentucky	110	104	92	89	84	93	107	93	104	99	103	103	106	87
Louisiana	252	235	217	204	196	223	210	223	227	229	231	253	247	238
North Louisiana	88	78	64	75	62	75	72	77	73	77	78	78	73	78
South Louisiana	164	157	153	129	134	148	138	146	154	152	153	175	174	160
Maryland	5	8	6	10	14	16	21	24	26	28	29	31	31	25
Michigan	116	120	110	108	95	120	111	111	102	111	110	122	114	115
Mississippi	27	27	26	31	26	36	31	43	37	37	37	38	36	37
Missouri	6	6	5	5	5	5	6	6	6	6	5	5	5	3
Montana	37	34	29	22	26	41	43	58	57	46	58	39	49	39
Nebraska	10	9	11	11	13	12	10	9	12	18	22	18	20	17
Nevada	....	1	2	2	1	2	2	2	2	1	1	1	1	1
New Mexico	87	108	113	125	129	118	114	121	117	149	168	187	166	177
New York	92	75	72	75	71	70	57	61	63	60	58	54	56	58
North Dakota	2	2	1	2	2	2	2	4	7	6	7	6	11	10
Ohio	156	140	126	128	123	119	156	162	167	149	155	156	156	146
Oklahoma	671	682	563	545	575	590	604	614	616	610	615	649	631	651
Oregon	1	1	....	....	....	....	....	....	....	....	....	....	....	....
Pennsylvania	250	243	205	217	219	214	241	239	262	252	262	244	243	240
South Dakota	....	....	....	....	....	....	....	....	1	1	3	3	3	3
Tennessee	7	8	7	6	6	6	5	5	9	9	8	7	7	7
Texas	1,469	1,485	1,403	1,482	1,534	1,544	1,679	1,567	1,651	1,701	1,829	1,835	1,801	1,899
Dist. 1: South Central	34	35	38	43	43	38	40	36	34	29	35	51	49	43
Dist. 2: Middle Gulf	50	57	45	56	56	55	59	60	62	66	58	78	66	73
Dist. 3: Upper Gulf	144	149	138	128	141	135	142	142	125	136	144	124	122	146
Dist. 4: Lower Gulf-S.W.	104	110	113	120	124	119	136	123	125	126	122	119	122	107
Dist. 5: East Central	22	29	38	34	35	26	34	29	34	26	29	30	29	27
Dist. 6: Northeast	37	50	43	33	34	34	39	45	42	40	41	43	45	53
Dist. 7-B: North Central	147	144	168	175	185	173	197	192	196	194	206	186	188	188
Dist. 7-C: West Central	105	109	133	131	145	146	176	148	173	177	220	253	255	265
Dist. 8: West	484	459	439	432	463	498	502	441	470	507	567	558	528	568
Dist. 9: North	239	236	158	237	225	234	257	250	267	274	281	269	272	299
Dist. 10: Panhandle	103	107	90	93	83	86	97	101	123	126	126	124	125	130
Utah	10	11	12	11	14	12	18	22	24	27	31	29	33	29
Virginia	1	1	1	1	2	1	1	1	1	1	1	1	1	1
Washington	....	....	....	....	....	....	....	1	1	1	1	1	1	1
West Virginia	210	205	210	205	200	195	202	204	220	205	215	205	200	208
Wyoming	86	85	83	78	92	106	99	118	123	113	112	98	104	84
Total	4,649	4,665	4,275	4,339	4,435	4,600	4,831	4,762	4,989	4,988	5,237	5,260	5,234	5,182

Bethlehem

. . . a dependable source of

OIL-COUNTRY SPECIALTY FORGINGS

If you manufacture rotary-drilling equipment, you'll be interested in various types of specialty forgings that Bethlehem can furnish you on a regular basis.

Examples:

DRILL-COLLAR BLANKS (rough-turned, rough-bored)

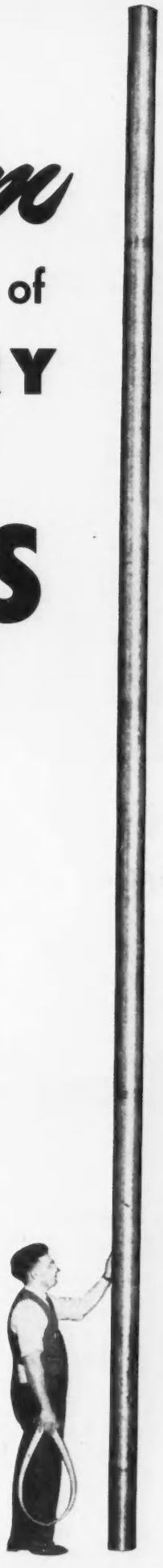
KELLY-BAR BLANKS (hexagonal section; rough-machined all over)

SLUSH-PUMP LINERS (one-piece, seamless, with collars integral; rough-machined)

These strong steel forgings are made under strict metallurgical controls. Nothing is left undone that will help achieve uniformity. Why not call or write us about your needs in this field? We'll gladly co-operate in every way possible.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



BETHLEHEM STEEL

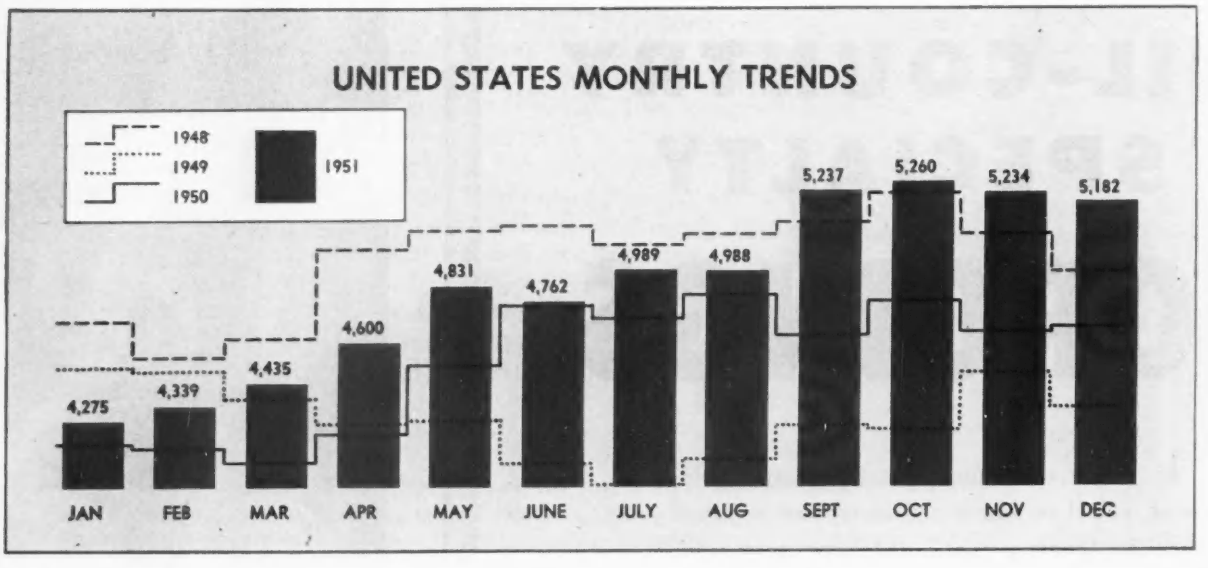
drilled in 1951, which was 9.3 percent more than the 159,393,997 feet drilled in 1950.

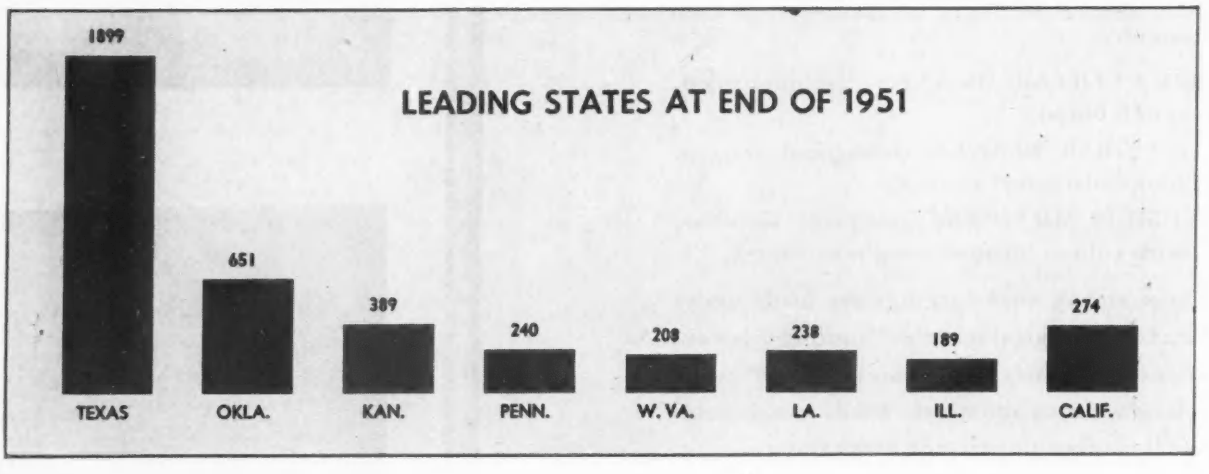
Footage drilled by the average of 4844 rigs in operation averaged out to 35,974 feet per rig during 1951. This compared with 35,300 feet per rig during 1950 and 32,000 feet per rig in 1949.

Average number of wells completed per rig during 1951 was 9.3, compared with 9.6 in 1950.

Heaviest contributors to the increased number of rigs in operation were the big, bustling West Texas and West Central Texas districts. West Texas (Texas Raiload Commission district 8) had 568 active rigs in December, 1951, compared with 459 for December, 1950, a gain of 109. Even more impressive was the gain registered in West Central Texas (District 7-C), which had 109 rigs in operation at the end of 1950, and 265 at the end of 1951 for a gain of 156.

DRILLING RIGS OPERATING IN U. S.

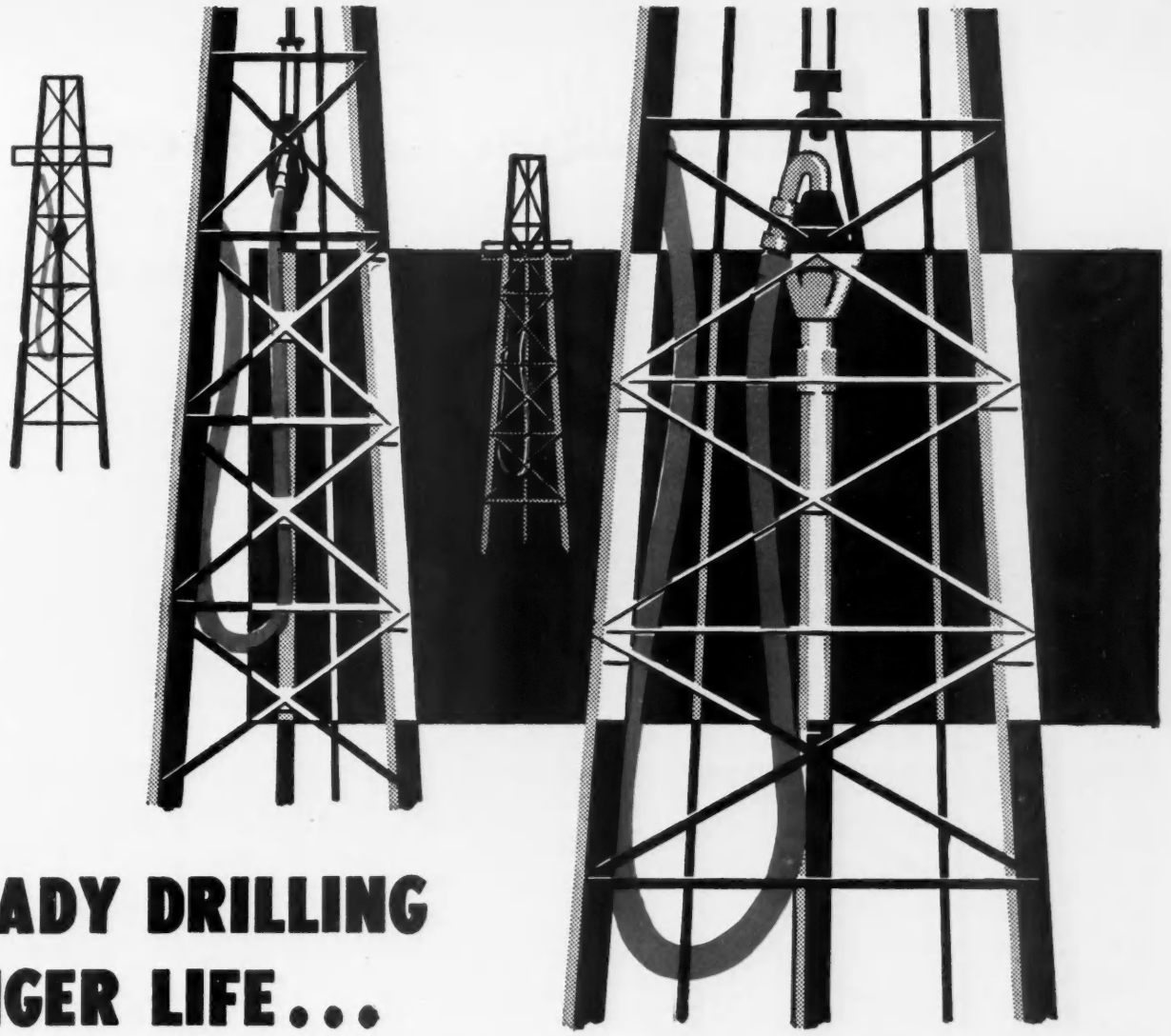




Drilling Rigs in Use in U. S., by Years, by Months

Figures are for end of month, and include rigs drilling, rigging up, and shut down

YEAR	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1938	3,968	3,928	3,973	3,971	3,582	3,830	3,737	3,869	3,742	3,876	3,676	3,434
1939	3,583	3,391	3,448	3,630	3,695	3,726	3,567	3,718	3,625	3,905	3,981	3,924
1940	3,990	4,277	4,472	4,327	4,655	4,502	4,235	4,194	3,821	3,921	4,030	3,894
1941	3,814	3,952	4,121	4,287	4,335	4,598	4,819	4,984	4,693	4,672	4,746	4,336
1942	3,816	3,067	2,979	2,859	2,868	2,905	3,179	3,007	2,953	3,094	2,962	2,797
1943	2,691	2,653	2,732	2,756	2,743	2,852	3,015	3,201	3,031	3,548	3,676	3,595
1944	3,427	3,568	3,702	3,819	3,934	4,278	4,411	4,528	4,566	4,738	4,665	4,640
1945	4,270	4,154	4,159	4,374	4,637	4,394	4,424	4,289	4,356	4,521	4,426	4,637
1946	4,337	4,229	4,212	4,405	4,399	4,124	4,235	4,201	4,474	4,410	4,551	4,654
1947	4,390	4,402	4,379	4,470	4,603	4,802	4,992	5,163	4,979	4,897	4,871	4,945
1948	4,699	4,542	4,626	4,989	5,067	5,090	5,013	5,058	5,116	5,229	5,060	4,908
1949	4,511	4,490	4,368	4,265	4,276	4,097	4,015	4,118	4,258	4,247	4,485	4,355
1950	4,180	4,169	4,114	4,224	4,518	4,760	4,712	4,804	4,633	4,773	4,649	4,665
1951	4,275	4,339	4,435	4,600	4,831	4,762	4,989	4,988	5,237	5,260	5,234	5,182



STEADY DRILLING LONGER LIFE...

RAY-MAN ROTARY HOSE

How could Rotary Hose be made safer, lighter and more flexible to handle? R/M engineers answered by developing one of the great improvements in the history of rotary hose . . . Ray-Man Rotary Hose • The Ray-Man method of winding high tensile steel wire strength members under precisioned tension permits rotary hose flexibility never before equaled. Strength and steadiness under high drilling pressures give greater safety and longer life than ever before • Other features, like the Lip-Lok seal in R/M's leak-proof, built-in coupling are described in Bulletin 6898. Your nearest National Supply Company representative can tell you how the new Ray-Man Rotary Hose speeds rig work and lowers drilling costs.

DISTRIBUTED BY NATIONAL SUPPLY COMPANY IN ALL PRINCIPAL OIL FIELDS

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

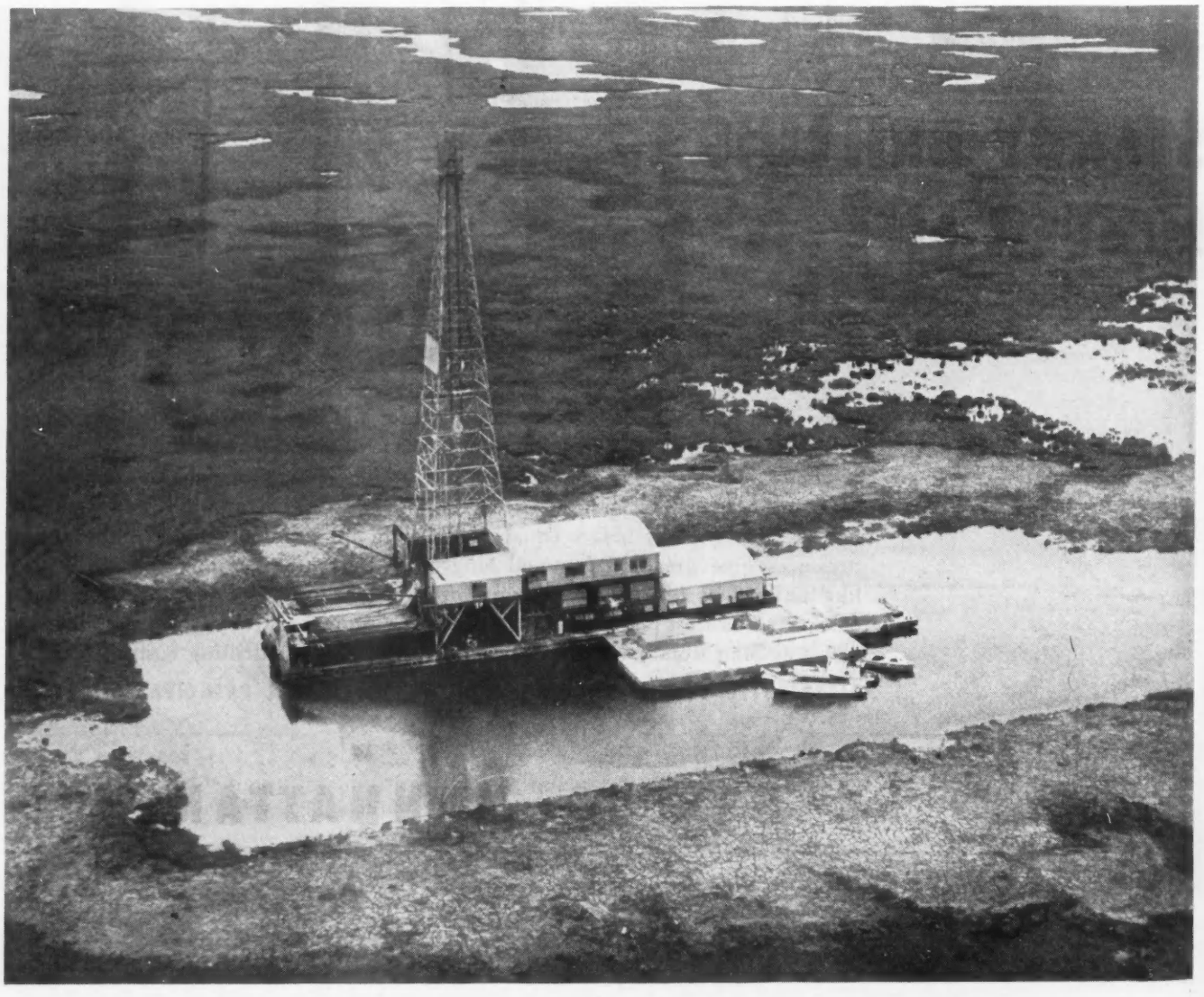
RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls

New Drilling Equipment

Results from Continued

ADVANCES IN the design of drilling equipment continue rapidly while the contractor and engineer emphasize the importance of learning better techniques and methods for using these improved tools. A net result of this concerted effort is more rapid drilling with the completion of straighter, better conditioned holes. In this discussion of some of the new equipment currently available to the drilling industry, the author indicates the importance of this dual role played by both the manufacturer and user. Included within this resume of a paper presented before the American Petroleum Institute, Houston Chapter, on February 5, are discussions of a new magnetic fishing tool, the latest ideas in barge designing, the application of diamond drilling and fishing tools, the torque converter, and other associated items.

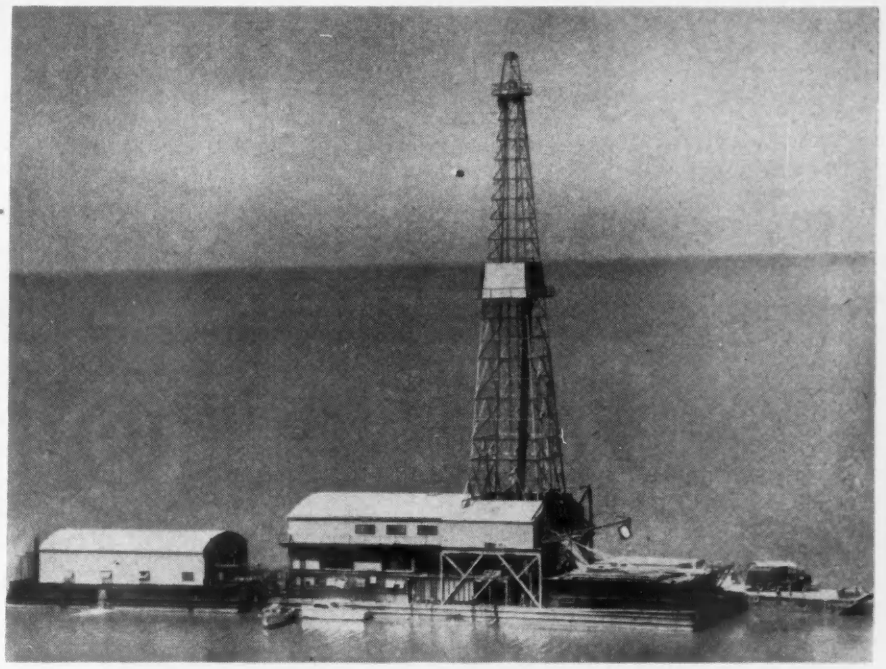


Rowan Drilling Company's complete, one-section, self-contained drilling barge, one of two designs used by the company.

Research

By GILBERT ROWE

Vice President
Rowan Drilling Company



This Rowan barge is divided to provide separate drill and power barges.

IT WOULD be difficult to point to any revolutionary changes in either equipment or practices which could be entirely credited to a particular period of time. Rather, the improvements realized have been the result of experiments and field trials which originated two, three, or more years ago. All of us realize that the practices followed today and the equipment used are forerunners of the more advanced methods and machines to come next year and the following years.

Progress made in well drilling, as in all phases of our industry, can be attributed to the spirit of free enterprise wherein competition, and the natural ambition to do a better job, are the driving forces. There are very few, if any, in the drilling contracting phase of the oil industry who do not strive to place better equipment and more experienced organizations, at the disposal of their customers. This same spirit in all groups of our industry is responsible for some very costly and extensive experiments being conducted at this time. One such experiment is the automatic drilling rig—today's forecast of an improvement in drilling machinery which may materialize in the near future. Scientists advise that a manufacturing plant, at the present time, could be operated by remote control and that various machine operations in a plant could be controlled by a code-punched card.

Drilling Research, Inc., is a nonprofit organization dedicated to the development of quicker and cheaper methods of drilling a hole in the ground. Several experiments are being carried on by this group that may prove beneficial. None of us can afford to be content with the machinery and equipment we have or with the way we do things now. We must keep pace with technological advancements in all fields, or our industry, like the buggy builder, will die on the vine.

Manufacturers Due Credit

It is only fair and proper that substantial credit should be given the manufacturers who have made numerous and beneficial mechanical refinements in their respective products. These improvements are too numerous to mention in detail. The increased use of torque converters in mechanical rig drives is an important improvement which offers real advantage in our drilling operations.

Passing on from equipment to practices in present day drilling, a review of the increased use of oil in drilling fluids, the efficiency of jet bits, the tendency toward the use of larger diameter drill collars in a given size hole where conditions permit, and the use of larger pumps is certainly in order.

Excellent papers have been written lately that conclusively show the advantage of adding diesel oil to the drilling fluid. Some of these dealt with:

Reduction of drill pipe torque.

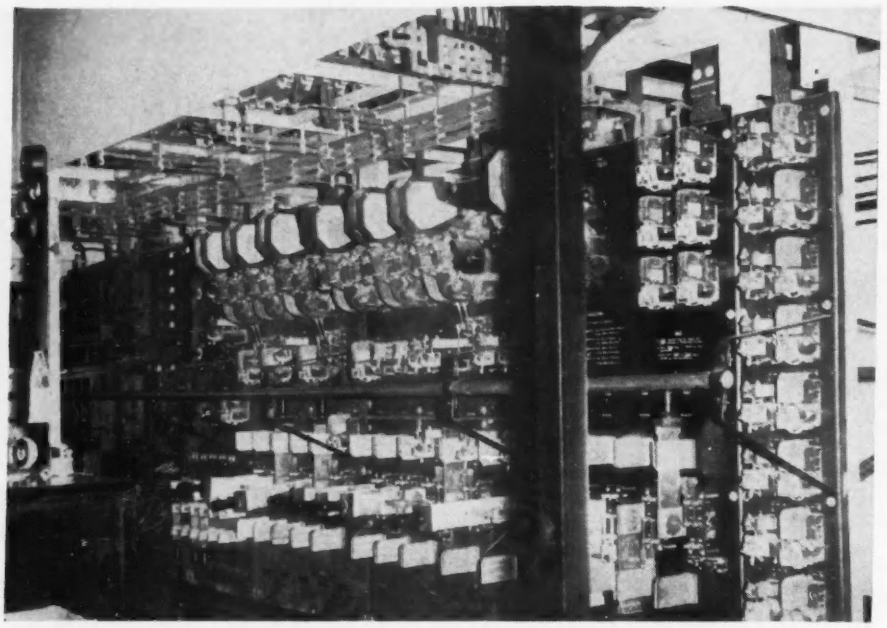
Prevention of balling or clogging by oil wetting of the steel.

Increased life of the drill bit.

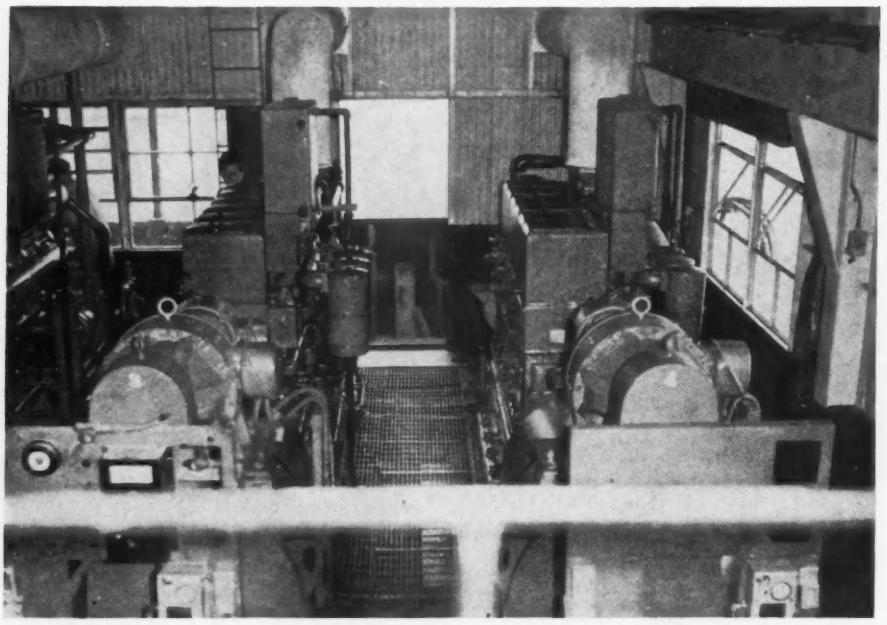
Last, but very important, the use of oil in the fluid is conducive to drilling a true bore hole.

This reduces the volume of costly mud required, the amount of cement used, the weight of cuttings to be pumped out, and offers numerous other advantages.

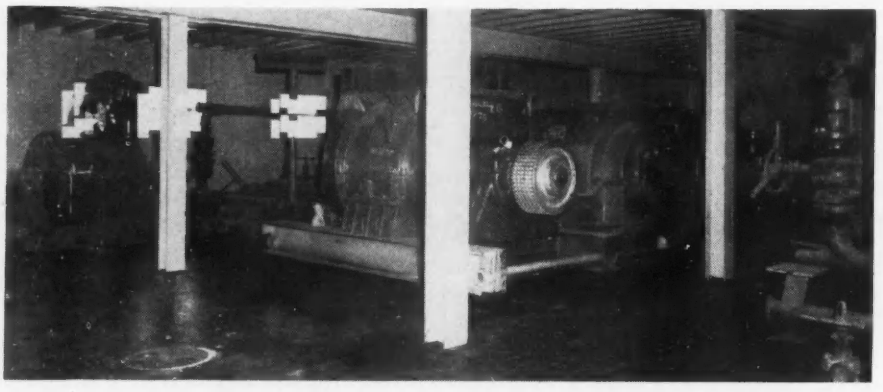
As for jet bits, both blade and rock, numerous papers have been presented giving statistical support for their increased use. When we



Barge master switchboard and control panel, showing hand rail. Rubber deck matting safeguards personnel.



Partial view of the Rowan drilling barge power plant, which consists of four 8-cylinder, 4-cycle, 9-inch bore x 19½-inch stroke, supercharged diesel engines, each rated 675 hp at 900 rpm. Supercharging is provided by turbochargers driven by the engine exhaust gases. Engines 1, 2 and 4 are direct coupled to 400 kilowatt direct current generators while engine 3 is direct-connected through a flexible coupling to a 300 kw d.c. generator.



The pump room of the barge houses three units, chain driven by a 400 hp direct current motor. Cooling air for each motor is furnished by a blower mounted on a 3 hp d.c. explosion-proof motor.

started using more jet bits, the industry became more pump conscious. It can be concluded, without detracting from the advantages attributed to the bits, that we gained equally as much by more effective utilization of our pump capacities and by the use of larger pumps. This is particularly true in the Gulf Coast area.

The use of larger diameter drill collars in a given size bore hole is gaining in popularity in hard rock country. From all reports, this practice has not been tried in the Gulf Coast areas. The advantages to be gained in this practice are:

- A greater concentration of weight directly on the bit.
- A decrease in the amplitude of flexing in the collar string, thereby increasing joint life. In the first eight months of 1950, Rowan Drilling Company had 31 drill collar failures while drilling 498,000 feet of hole in West Texas. In a like period in 1951, while drilling 544,131 feet of hole, 19 failures were experienced. Part of this can be attributed to the use of larger collars. The rest can be credited to better and closer inspection.
- A stabilizing effect in zones where crooked hole trouble exists.

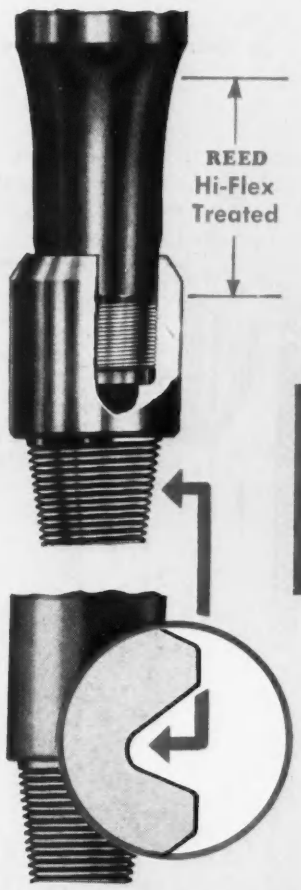
The disadvantages of this practice are, of course, obvious in an area where zones are easily broken down and loss of circulation occurs. Both the reduced annular space and the piston effect when going in the hole will cause the wall to break down unless extreme caution is exercised.

To this point the discussion has been restricted to new equipment and practices; however, there is another avenue for substantial improvement with no expense involved. Reference is to a closer working relationship by the various groups making up our complete picture—call it better communications, if you please. Most costly delays and misunderstandings could be avoided if we all took a little extra time to talk over mutual problems both within our various organizations and with each other. We have figures to show that in fields where we have had a continuity of work, we have each year improved our expended work time over the goal achieved in the preceding year. Granted that part of this improvement results from the experience derived in the area involved. Part of it results from the gradual, closer relationship among the various working units concerned.

(See photos and drawings on pages 126, 128, 130, 132.)

You get longer life and greater safety with REED HiFLEX TREATED *Super Connection Drill Collars*

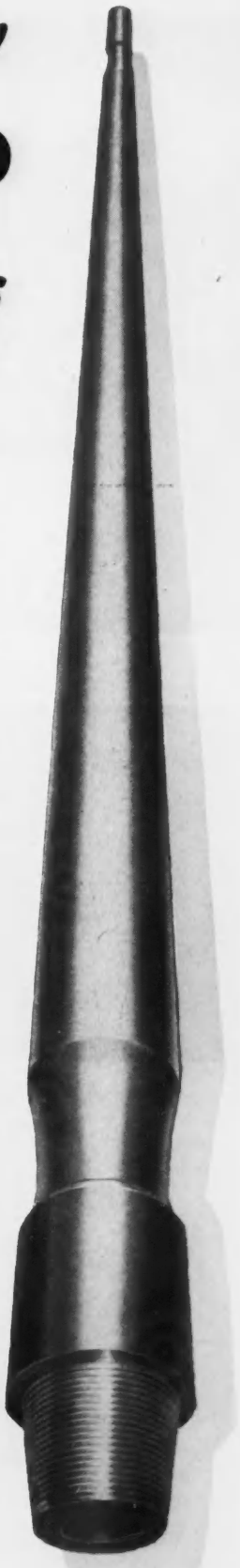
The **REED** Hi-Flex treatment is a physical working of the surface of the steel so that the skin is placed under compression. It enables the steel to stand a much higher number of flexures without cracking, and it greatly increases fatigue life.



Hi-Flex Treated to Prevent Fatigue Cracks From Starting

CHECK THESE "LOWER-COST" ADVANTAGES

- The Super Grip replaceable connectors are shrunk onto the drill collar.
- Hand applied (no bucking-on machine required).
- Can be applied to, or removed from, the drill collar at the drilling rig.
- No transportation cost to machine shop when joints wear past usable stage.
- No handling subs necessary.
- Same precision threads on pin and box at all times.
- No loss of length of drill collar when connectors are changed.
- No more "shopping" of your drill collar for re-threading — instead — the damaged or worn threads can be REPLACED by hand at the rig with factory-milled and factory-heat-treated threads.



REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

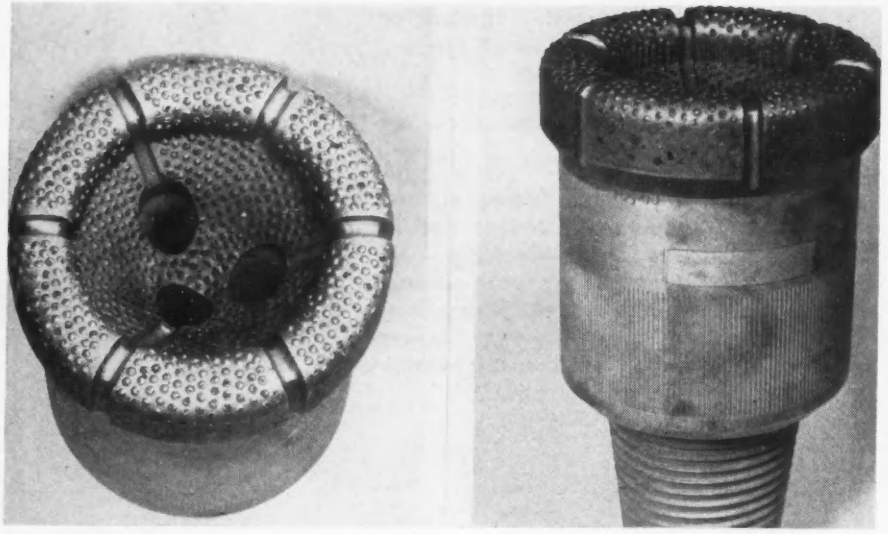
NEW YORK LONDON BUENOS AIRES

THE MARK OF QUALITY

2610

View of substructure system of Rowan drilling barge.

View of mud storage space.

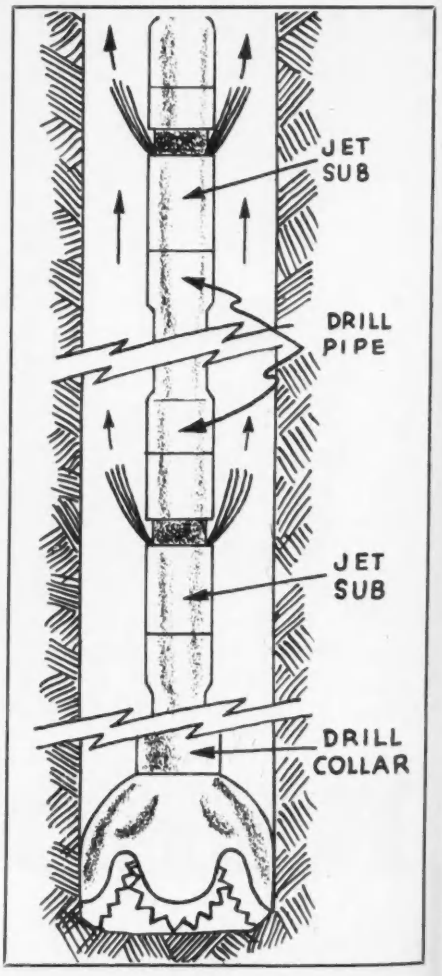


The diamond core bit offers advantage in the penetration of hard formations, such as chert. The tool design is similar to the diamond core head; however, the diamond studded insert permits cutting a full section of hole.

The jet sub offers promise in working formations tending to thief drilling fluid. The illustrated tool has been employed on several Spraberry jobs in West Texas. It is suspected that clean fluid must be used when the tool is in operation. In present day applications, three or four jet subs are used in a string.

About the Author

GILBERT ROWE, Vice President in Charge of Operations for Rowan Drilling Company, began his oil field career in 1928 with Humble Oil & Refining Company. Beginning in 1930, he was transferred to Creole Petroleum Company, Venezuela, where he remained until 1936. His service with both companies included operational assignments in drilling, producing and equipment. In 1936 he became affiliated with Emsco Derrick and Equipment Company as shop superintendent and in 1937 transferred to Hunt Tool Company as shop superintendent and chief engineer. He remained there until 1944 when he joined the Rowan organization as chief engineer.



Multi-V Belts For Tough Oil Field Service

Here's a cost-cutting combination! Thermoid Multi-V Belts . . . Rotary Hose . . . Mud-Flow Suction Hose . . . Flexible Discharge Units.

The going is tough for any equipment in oil field service. But not too tough for Thermoid Multi-V Belts!

Thermoid Multi-V Belts are pre-stretched to insure maximum power transmission without adjustment. They are constructed for flexibility and for ability to absorb repeated shocks—thoroughly impregnated with special rubber compounds to withstand moisture and abrasion. The result is longer belt life.

Thermoid Multi-V Belts are available in matched sets... uniform in size and cross section. Their longer life and non-slip performance add up to the lowest possible cost in any service.

Thermoid Multi-V Belts reflect the same care in manufacturing... the same constant research aimed at product improvement ... that have made Thermoid Products the standard of performance in the oil fields.

Mid-continent Office and Warehouse: Houston, Texas

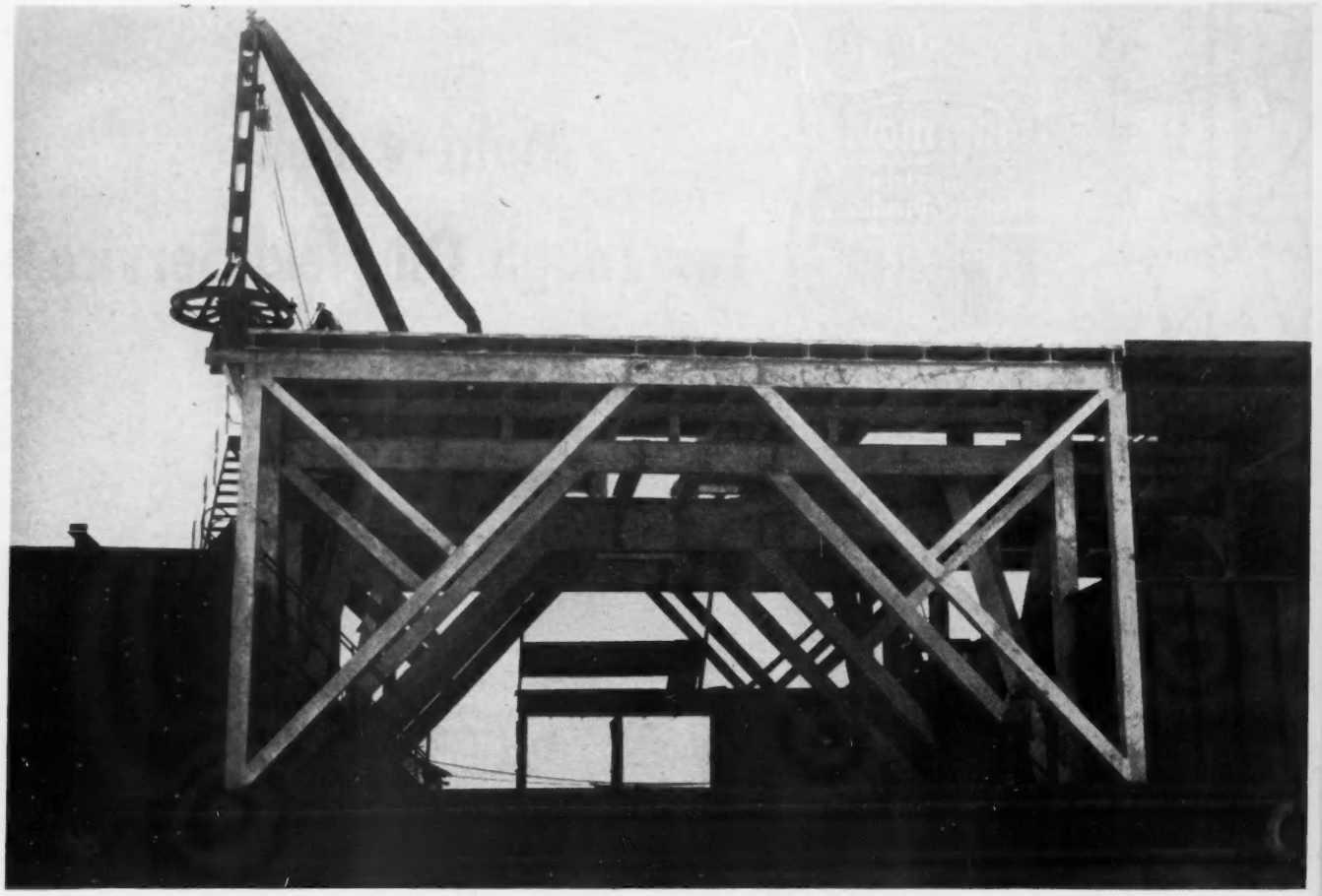
SEE OUR CATALOG IN THE COMPOSITE CATALOG

Thermoid

Powerflex Rotary Hose • Trioflex Slim-Hole Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • F.H.P. and Multiple V-Belts • Oil Country Flat Belting

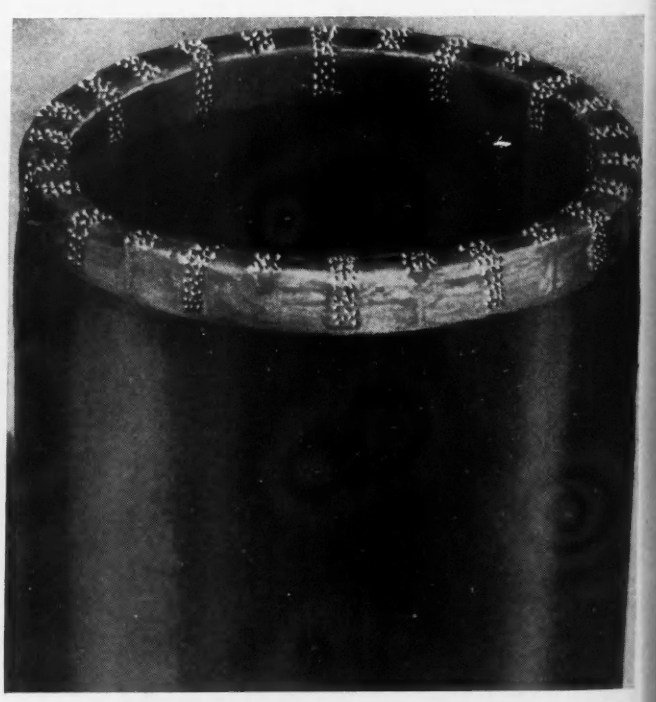
Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Brake Blocks

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah



The substructure system of the Rowan Drilling barge is designed to permit free movement of the blowout preventers. Adequate space is available for storing preventers not in use. The structure is designed to support either a 154 x 30-foot, or a 187 x 38-foot derrick.

The improved magnetic fishing tool has found a useful purpose in field operation. Early models were not designed with water courses and it was difficult to flush cuttings from the fish and tool. The model shown is complete with water courses, and the case is non-magnetic.



The diamonds in this recent type of washover shoe are set in field shops. Although the tool offers definite advantages in washover operations, care must be taken in installing the inserts to eliminate the possibility of leaving any of the lugs in the hole.

In many areas-

a key to GREATER PROFITS!

AMERICAN IRON
Flash Welded
TOOL JOINTS

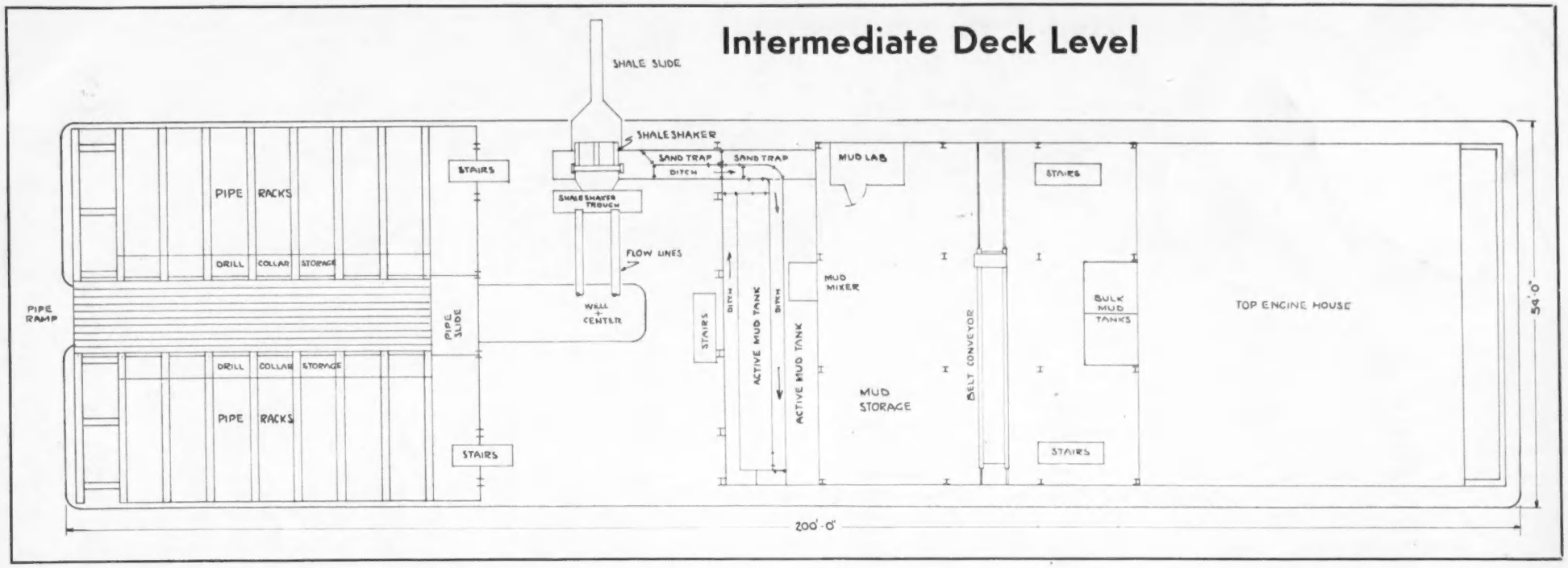
In many areas — a flash welded, unitized drill string provides advantages that make for greater profits! In these areas, you'll find that American Iron "Flash Welded" Tool Joints provide the key to the most effective, economical performance from this type drill string!

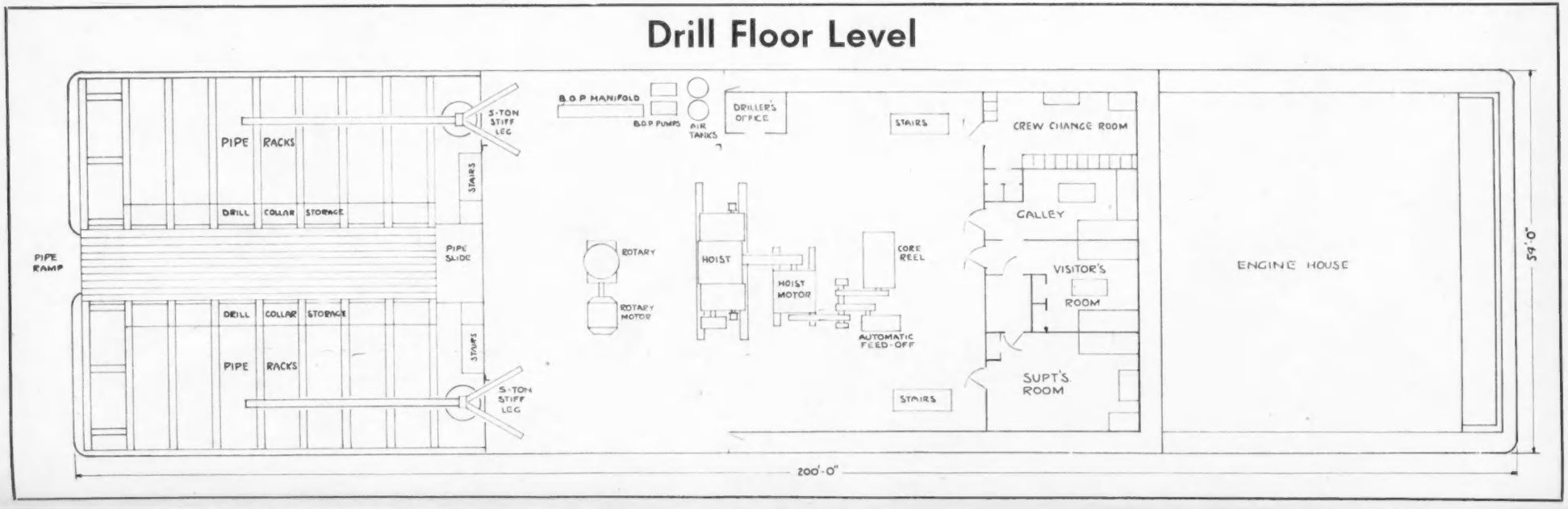
Three important factors make American Iron "Flash Welded" Tool Joints outstandingly dependable. They're DESIGNED RIGHT . . . MADE RIGHT . . . and INSTALLED RIGHT, with gigantic controlled surges of electricity welding tool joints to drill pipe — forming integral units!

Manufacturers of A.P.I., "Straight Grip," "Amweld," and Tubing Tool Joints

AMERICAN IRON & MACHINE WORKS CO.
OKLAHOMA CITY, OKLAHOMA
DISTRICT OFFICE: HOUSTON, TEXAS
EXPORT OFFICE: 37 WEST 42ND STREET, NEW YORK, N. Y.

AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF A OIL FIELD EQUIPMENT
REG. U.S. PAT. OFF.
OKLAHOMA CITY U.S.A.
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER


Intermediate Deck Level
SHALE SLIDE
SHALE SHAKER
SAND TRAP
SAND TRAP
DITCH
SHALE SHAKER TROUGH
FLOW LINES
WELL CENTER
MUD LAB
STAIRS
PIPE RACKS
DRILL COLLAR STORAGE
PIPE RAMP
PIPE SLIDE
STAIRS
DITCH
ACTIVE MUD TANK
DITCH
ACTIVE MUD TANK
MUD MIXER
MUD STORAGE
BELT CONVEYOR
BULK MUD TANKS
TOP ENGINE HOUSE
54'-0"
200'-0"


Drill Floor Level
B.O.P MANIFOLD
B.O.P PUMPS
AIR TANKS
DRILLER'S OFFICE
STAIRS
CREW CHANGE ROOM
GALLEY
VISITOR'S ROOM
ENGINE HOUSE
54'-0"
PIPE RACKS
5-TON STIFF LEG
DRILL COLLAR STORAGE
PIPE RAMP
PIPE SLIDE
ROTARY
ROTARY MOTOR
HOIST
HOIST MOTOR
CORE REEL
AUTOMATIC FEED-OFF
SUPT'S ROOM
200'-0"

new

BJ

PYRAMID TOOTH

tong die

WON'T CHIP... soft ends...no eye injuries!

POSITIVE GRIP... grips like a die has never gripped before!

TOUGHER THAN EVER... built to take plenty of punishment and still keep going!

REVERSIBLE... does twice as much work at no extra cost!

REMEMBER...

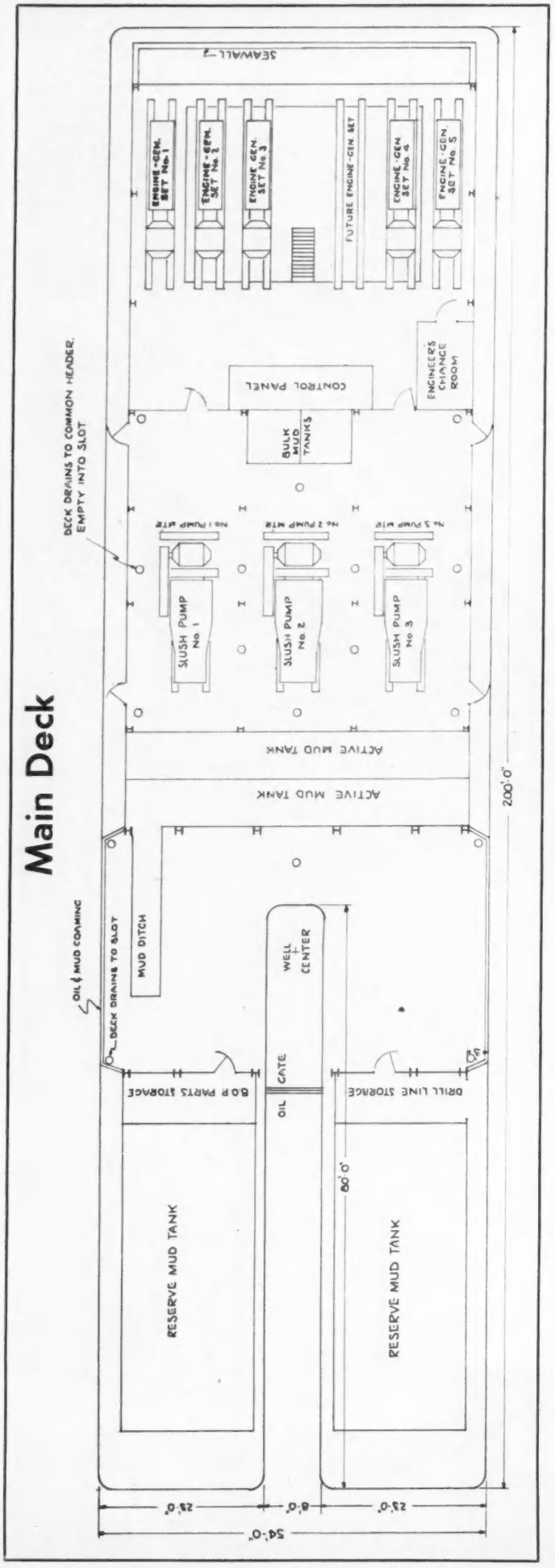
look for the red box with the big "BJ"

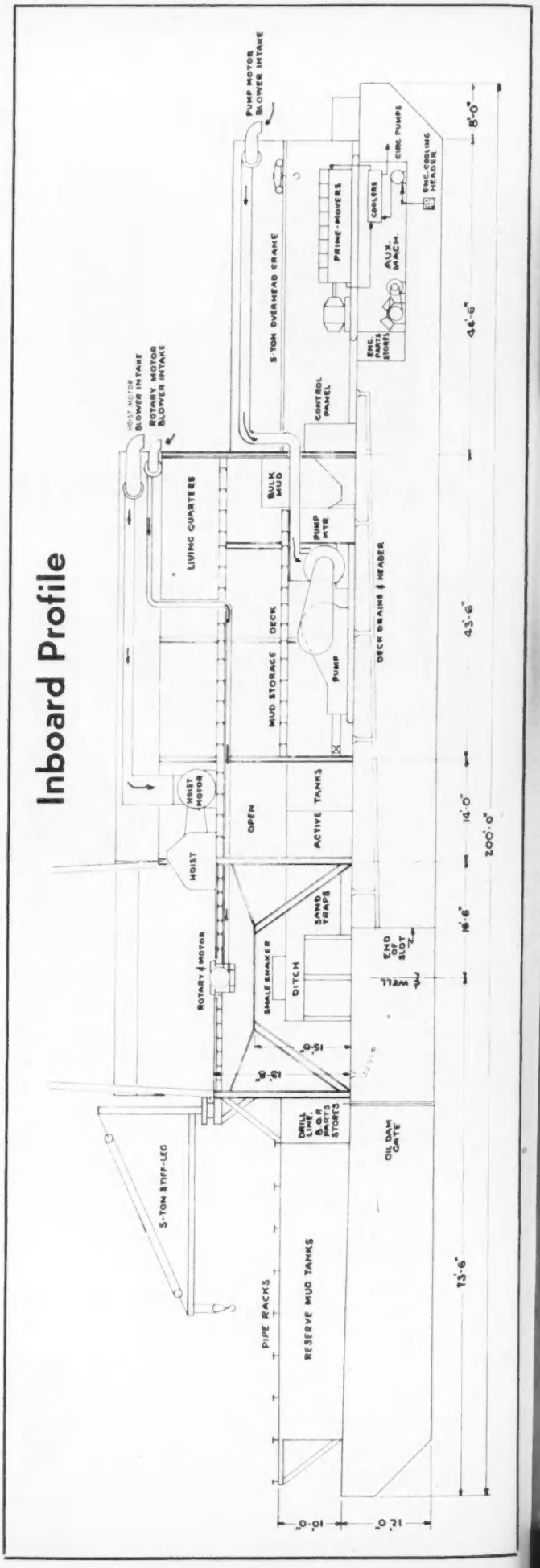
BJ TONG DIES
also available in Standard Tooth and Coarse Tooth styles. Made in all types for all tongs.

Stocked by supply stores in every field...or ask your BJ representative.

Another **BJ** *Engineered Product*

Byron Jackson Co.
Since 1872
MAIN OFFICE & PLANT: LOS ANGELES 54, CALIF.
Mid-Continent Office & Plant: Houston 1, Texas
Export Office: New York 17, New York
JOBBERS IN ALL PRINCIPAL OIL FIELDS


Main Deck
SEAWALL
ENGINE-GEN. SET No. 1
ENGINE-GEN. SET No. 2
ENGINE-GEN. SET No. 3
FUTURE ENGINE-GEN SET
ENGINE-GEN SET No. 4
ENGINE-GEN. SET No. 5
ENGINEER'S CHANGE ROOM
CONTROL PANEL
BULK MUD TANKS
DECK DRAINS TO COMMON HEADER. EMPTY INTO SLOT
No. 1 PUMP MTR
No. 2 PUMP MTR
No. 3 PUMP MTR
SLUSH PUMP No. 1
SLUSH PUMP No. 2
SLUSH PUMP No. 3
ACTIVE MUD TANK
ACTIVE MUD TANK
200'-0"
OIL & MUD COMING
DECK DRAINS TO SLOT
MUD DITCH
WELL CENTER
B.O.P. PARTS STORAGE
OIL GATE
DRILL LINE STORAGE
80'-0"
RESERVE MUD TANK
RESERVE MUD TANK
23'-0"
6'-0"
23'-0"
54'-0"


Inboard Profile
PUMP MOTOR BLOWER INTAKE
5-TON OVER-HEAD CRANE
PRIME-MOVERS
COOLERS
CIRC. PUMPS
AUX. MACH.
ENG. COOLING HEATER
ENG. PARTS STORES
8'-0"
44'-6"
HOIST MOTOR BLOWER INTAKE
ROTARY MOTOR BLOWER INTAKE
CONTROL PANEL
BULK MUD
LIVING QUARTERS
PUMP MTR.
MUD STORAGE DECK
PUMP
DECK DRAINS & HEADER
43'-6"
HOIST MOTOR
OPEN
ACTIVE TANKS
HOIST
16'-0"
200'-0"
SAND TRAPS
ROTARY & MOTOR
SHALE SHAKER
DITCH
END OF SLOT
WELL
18'-6"
DRILL LINE & B.O.P. PARTS STORES
OIL DAM GATE
5-TON STIFF-LEG
PIPE RACKS
RESERVE MUD TANKS
13'-6"
10'-0"
12'-0"

WHAT IS THE "Depth Expectancy" OF A LEE C. Moore 142 FOOT MAST?

Experience in drilling with a Moore 142 foot mast shows that depths far below average can be reached. Wells below 15,500 feet have already been drilled with this big mast.

Lee C. Moore Big Masts are designed for big jobs. So far no job has been too big. Check their strength, ruggedness and durability, and you'll see why the toughest drilling job is in good hands when you use a Lee C. Moore Big Mast.

LEE C. MOORE CORPORATION

TULSA • DALLAS • HOUSTON • MIDLAND • SHREVEPORT • WICHITA • CENTRALIA • PITTSBURGH

Contract Drilling

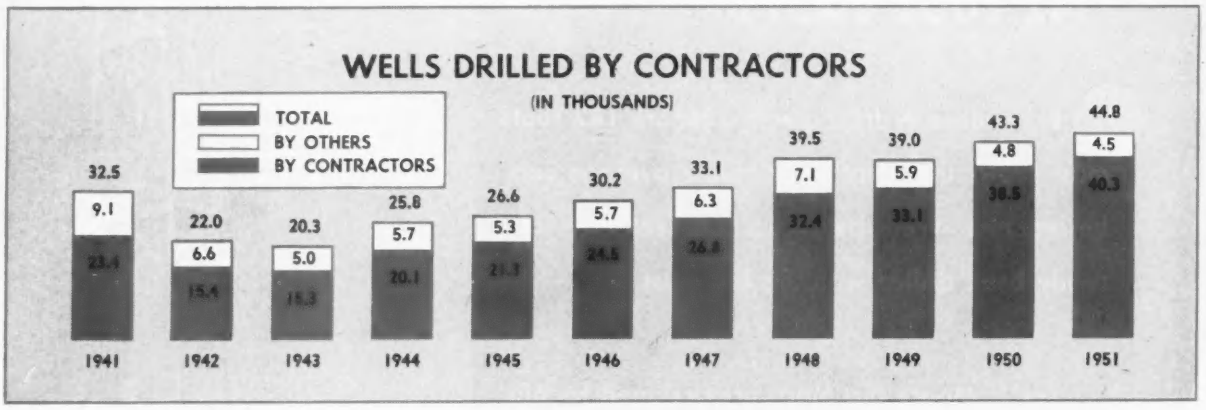
Accounts for 90 Percent of U. S. Wells

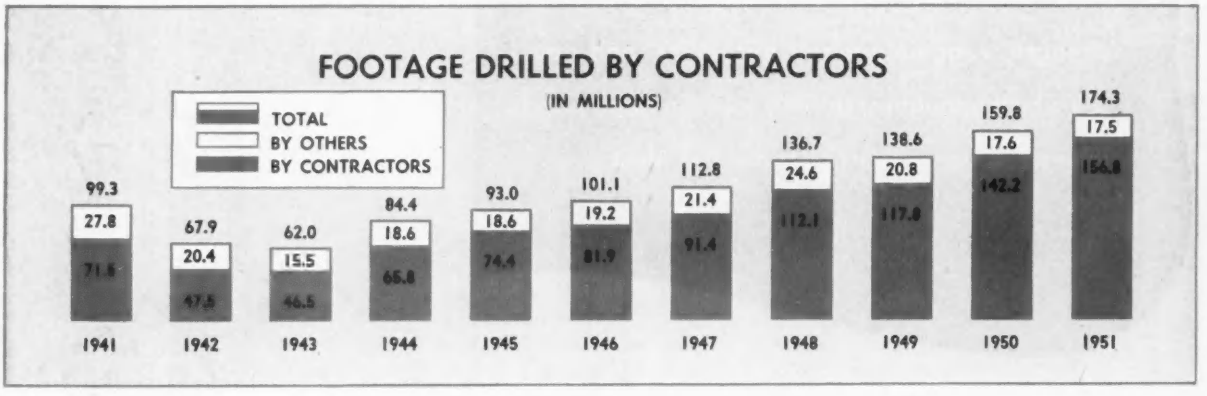
AN EVER larger portion of the wells completed in the U. S. are drilled on a contract basis. During the past ten years, drilling done by contractors has increased from 70 percent to 90 percent of all wells completed.

Consequently, of the 44,826 new wells drilled in the U. S. last year, contractors were responsible for the drilling of 40,343, indicating they drilled 156,835,546 feet of the 174,261,718 feet of hole.

A year ago the work done by contractors constituted only 89 percent of the wells, or 38,543 of the 43,307 wells drilled, and drilled 142,187,941 feet of the 159,761,732 feet of hole drilled in the nation.

Whereas the number of wells completed in 1951 was 11,316 greater than finished in 1941, contractors in 1951 drilled 16,936 more than they did in 1941. The increase in footage has been even greater, the amount of hole drilled by contractors in 1951 being more than double the 71½ million feet they completed in 1941.





Wells and Footage Drilled by Contractors

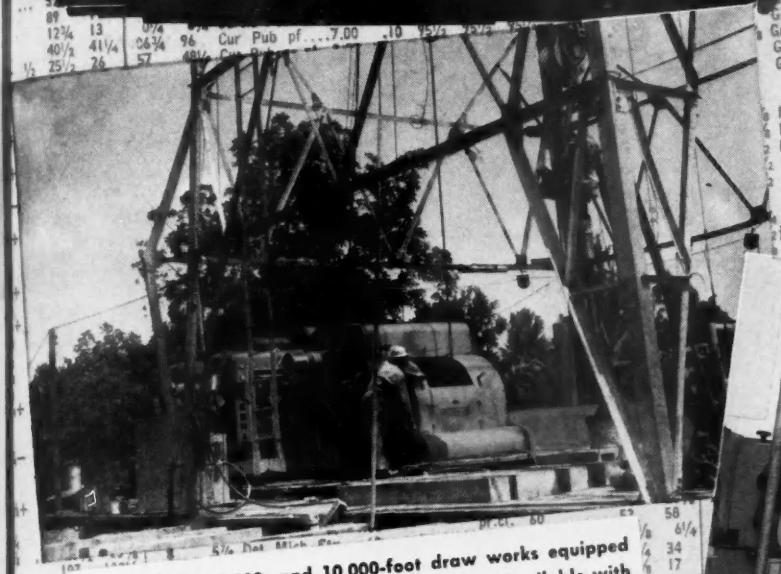
YEAR	Total New Wells Completed	Total Footage Drilled	INDICATED WORK BY CONTRACTORS			YEAR	Total New Wells Completed	Total Footage Drilled	INDICATED WORK BY CONTRACTORS		
			Percent of Wells	Wells Drilled	Footage Drilled				Percent of Wells	Wells Drilled	Footage Drilled
1941	32,510	99,347,714	72	23,407	71,503,354	1947	33,147	112,816,124	81	26,849	91,381,060
1942	21,990	67,903,053	70	15,393	47,532,137	1948	39,477	136,709,153	82	32,371	112,101,505
1943	20,349	61,991,857	75	15,262	46,492,893	1949	38,962	138,616,941	85	33,118	117,824,400
1944	25,786	84,378,457	78	20,113	65,815,196	1950	43,307	159,761,732	89	38,543	142,187,941
1945	26,649	92,982,113	80	21,319	74,385,690	1951	44,826	174,261,718	90	40,343	156,835,546
1946	30,230	101,124,813	81	24,486	81,911,099						

Data on percent of wells from American Association of Oilwell Drilling Contractors.

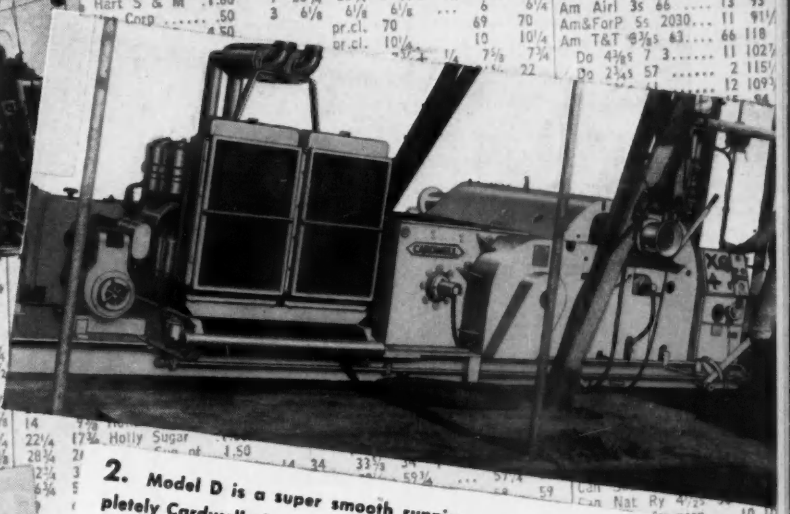
THE WALL STREET JOURNAL, Thursday, February 8, 1951

Blue Chip INVESTMENTS

4 REAL DRAW WORKS



1. Model O, 8,000- and 10,000-foot draw works equipped throughout with Cardwell air friction clutches. Available with two engines for 8,000-foot drilling or three engines and torque converter for 10,000-foot drilling.



2. Model D is a super smooth running, modern draw works. Completely Cardwell air clutched, including the clutches running in oil bath in the chain transmission. The Model D is a fast, compact 5,000-foot drilling rig with single large or twin engine or two separate engines.

3. Model S, 5,000-foot draw works combines fast operating speed with extreme portability. Cardwell air friction clutches throughout.

4. Model L is the lightest weight and the most up-to-date 3,500-foot draw works. All drives, and the sand line and main drum, are through Cardwell air friction clutches.

CARDWELL
REG. U. S. TRADE MARK PAT. OFFICE
THIS TRADE MARK INSURES HIGHEST QUALITY AT LOWEST PRICE

CARDWELL MFG. CO. INC.
P. O. Drawer 2001 . . . Long Distance Telephones 128—129—130
Cable Address: "ALL STEEL," Wichita — "CARDSTEEL," New York
Wichita, Kansas, U. S. A.

TWENTY-FIVE YEARS CARDWELL SERVING THE OIL INDUSTRY

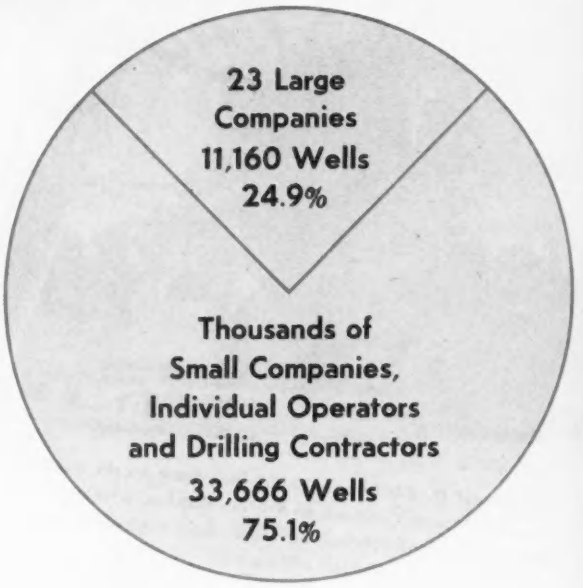
Wells Completed

Owned Mostly by Small Firms

THE larger producing companies in the U. S. own only a comparatively small portion of the wells drilled. During 1951 the 23 largest producing companies, who normally account for almost 60 percent of the oil produced, owned 11,160 of the 44,826 wells completed, or 24.9 percent of the total.

Thus, the thousands of small companies and individual operators owned 33,666 wells, or 75.1 percent of all wells drilled last year.

The larger companies were responsible for a slightly larger part of the drilling in 1951 than in 1950. During the latter year they owned 8770 of the wells drilled, or 20.3 percent of all well completed in the U. S.

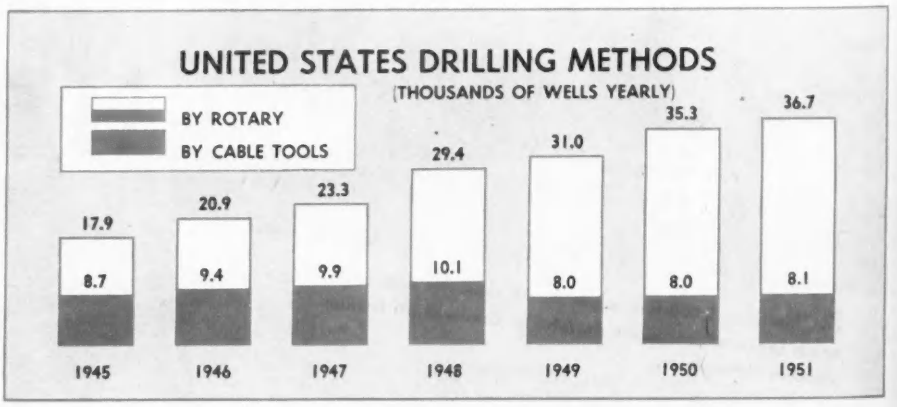


Wells Drilled

Largely by Rotary Method

ROTARY rigs accounted for 82 percent of the wells drilled in the U. S. as contrasted with only 67.2 percent in 1945. This gain, coupled with the great increase in total number of wells drilled, more than doubled the number of wells drilled by the rotary method in the U. S. The 36,757 wells credited to rotary rigs in 1951 compared with 17,908 in 1945.

While percentage of tool wells drilled by cable tool rigs declined from 32.8 percent in 1945 to 18.0 percent in 1951, the number of wells drilled by cable tool methods remained almost constant at 8000 yearly.



How U. S. Wells Are Drilled

YEAR	Total New Wells Completed	ROTARY DRILLING		CABLE TOOL DRILLING	
		Percent of Total	Wells Drilled	Percent of Total	Wells Drilled
1945	26,649	67.2	17,908	32.8	8,741
1946	30,230	69.0	20,859	31.0	9,371
1947	33,147	70.2	23,269	29.8	9,878
1948	39,477	74.5	29,410	25.5	10,067
1949	38,962	79.5	30,975	20.5	7,987
1950	43,307	81.5	35,295	18.5	8,012
1951	44,826	82.0	36,757	18.0	8,069

Percent Rotary and Cable Tool Drilling from American Association of Oilwell Drilling Contractors.

in WIRE ROPE, too it takes the RIGHT KIND of muscle

The long flat muscles of the black panther give him the spring and suppleness he needs to survive in his particular environment. They're ideal for the job they're called upon to perform.

So, too, with wire rope! Specific jobs call for the right kind of muscle; the right construction and lay of the rope; the right grade of steel and size of wire...to best withstand the destructive forces encountered.

Wickwire Rope gives you the benefit of long experience and specialized know-how which assures you of exactly the right kind of rope your particular job demands.

For additional information write or phone our nearest sales office.

THE COLORADO FUEL & IRON CORPORATION–Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
THE CALIFORNIA WIRE CLOTH CORPORATION–Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION–Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New York • Philadelphia

LOOK FOR THE YELLOW TRIANGLE ON THE REEL

WICKWIRE ROPE

CF&I

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL & IRON CORPORATION

Rig Ownership

Largely in Hands of Contractors

MOST drilling rigs in the U. S. are owned by drilling contractors. Of the approximately 5400 rigs in the nation, contractors own about 4600, or 85 percent of the total.

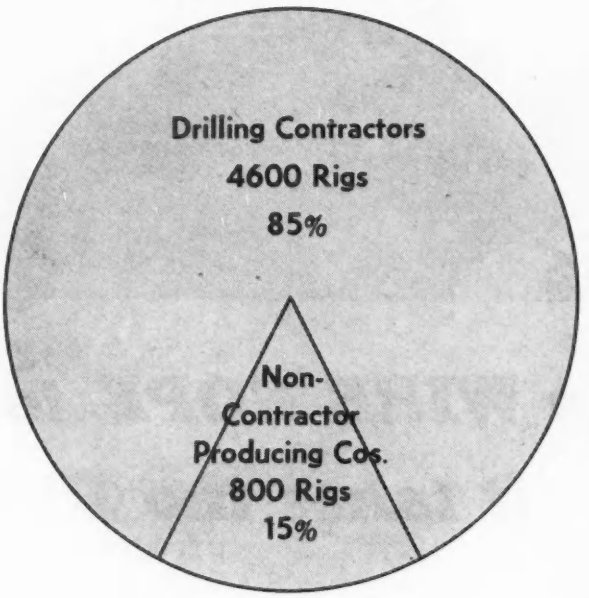
Contractors' rigs consist of approximately 3200 rotaries and 1400 cable tool rigs, comprising 85 percent of the rotary rigs and 82 percent of the cable tool rigs, since it is indicated that there are 3700 rotary rigs and 1700 cable tool rigs in the U. S. The remaining 800 rigs, made up of approximately 500 rotaries and 300 cable tool rigs, are owned by about 200 producing companies who do not engage in contract drilling, using their rigs to drill a part of their own wells.

Rig ownership among rotary contractors is widely diversified. A survey by WORLD OIL which was able to determine accurately the ownership of 3395 of the estimated 3700 rotary rigs in the nation, revealed only 10 contractors owned 20 or more rotary rigs; only 32 contractors owned from 10 to 19 rigs; 147 contractors owned from 5 to 9 rotary rigs each; while 530 contractors owned from 1 to 4 rotary rigs each.

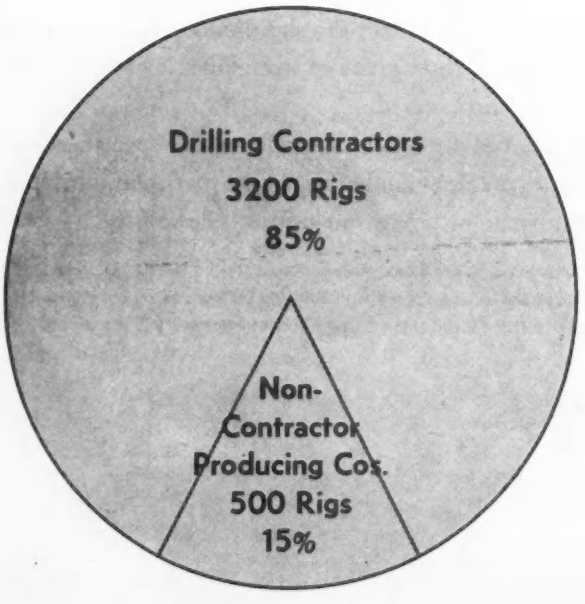
At today's value the investment in 3200 contractor rotary rigs would range from $800 million to $900 million.

Of the approximately 5400 rigs in the U. S., 5182 were operating at the close of 1951, with the remainder moving between jobs or temporarily idle. The six leading producing states (Texas, Oklahoma, California, Louisiana, Kansas and Illinois) accounted for 3640, or 70 percent of the active rigs, with 24 other states the locale for the remainder.

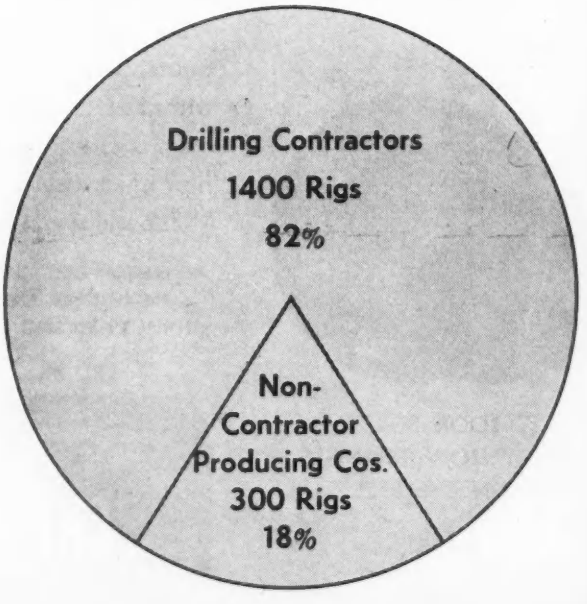
Ownership of All Rigs



Rotary Rig Ownership



Cable Tool Rig Ownership

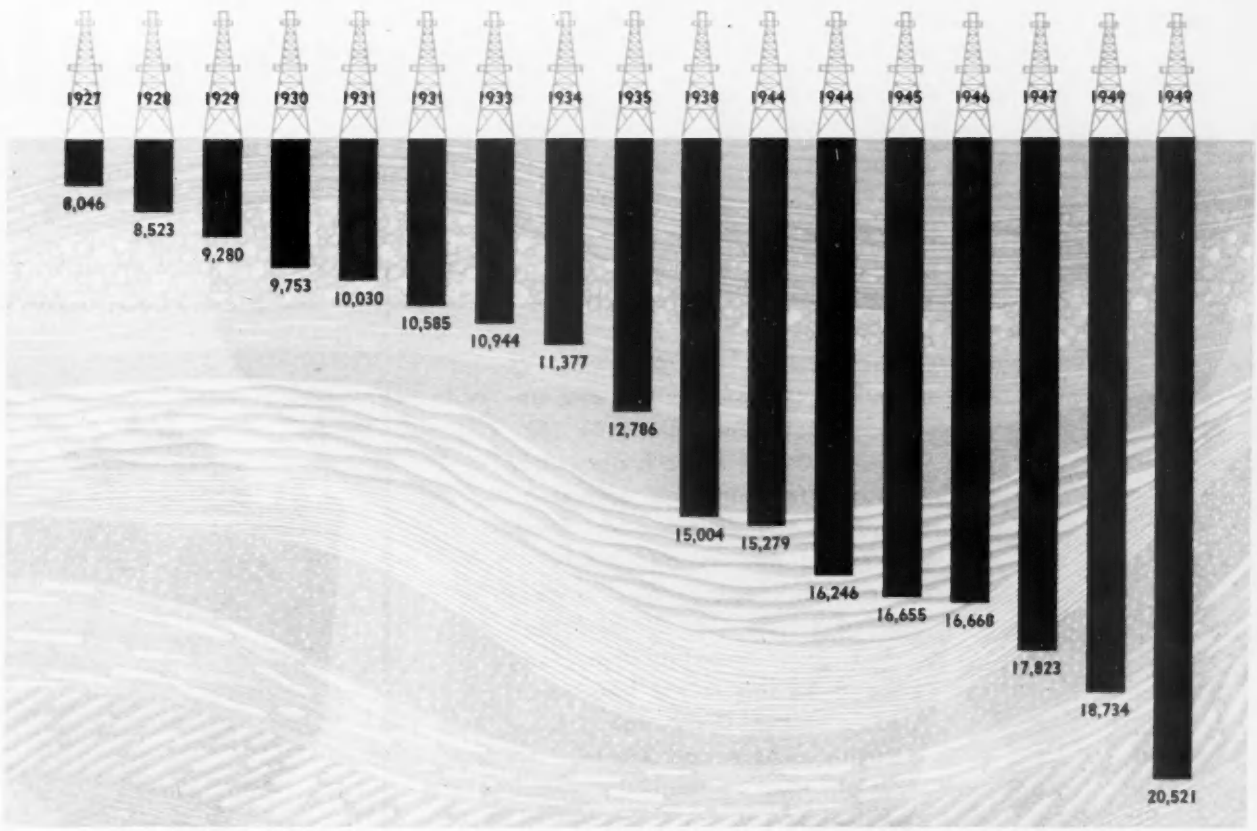


Drilling Depth Records

Established in Nine Areas

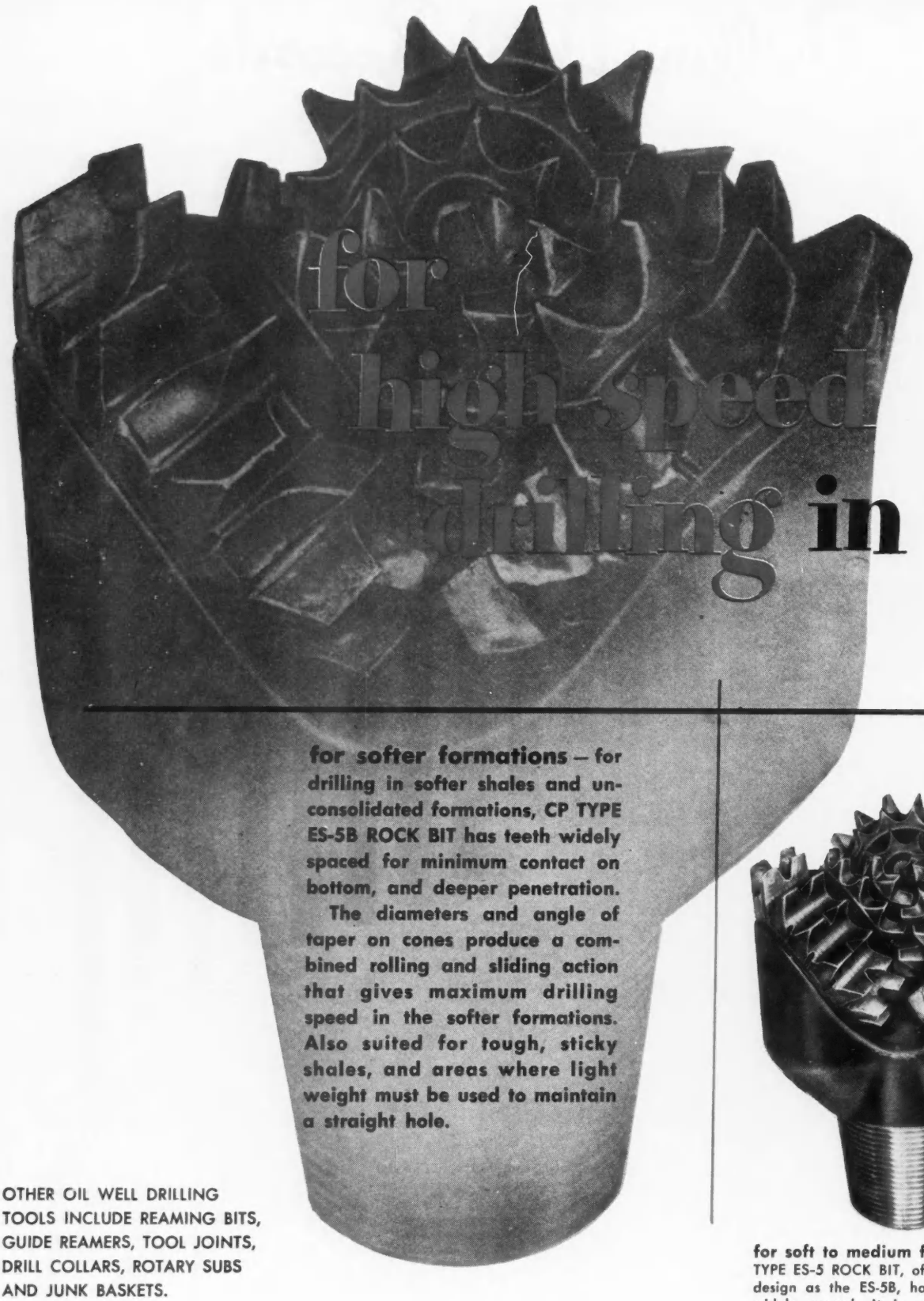
THE world's drilling depth mark remained uneasily in Wyoming during 1951, though the year contained the deepest drilling in history and held the constant threat of a Mississippi test that may yet shatter all records.

The record for the deepest hole is still held by The Superior Oil Company of California's Unit 1, which in 1949 went down 20,521 feet in Sublette County, Wyoming. But in 1952, as in 1951, there is the possibility that George Vasen et al's Tung Oil Corporation of America, Stone County, Mississippi, will go deeper. Spudded in 1949 with an old rig designed for only medium-depth drilling, the test was at 19,875 feet a year ago—which was just 646 feet short of the Sublette record holder. As 1952 began, it was



(Includes both Dry and Producing Wells)

Year	WELL and LOCATION	Feet
1927	Chansler-Canfield-Midway Oil Company's Olinda 96, Olinda, California	8,046
1928	Texon Oil and Land Company's University 1-B, Big Lake, West Texas	8,523
1929	Shell Oil Company's Nesa 1, Long Beach, California	9,280
1930	Standard Oil Company of California's Mascot 1, Midway, California	9,753
1931	Chansler-Canfield-Midway Oil Company's Hobson A-2, Rincon field, Ventura County, California	10,030
1931	Penn-Mex Fuel Company's Jardin 35, State of Vera Cruz, Mexico	10,585
1933	North Kettleman Oil & Gas Company's (later taken over by Union Oil Company) Lillis-Welch 1, Kettleman Hills, Kern County, California	10,944
1934	General Petroleum Corporation's Berry 1, Belridge, Kern County, California	11,377
1935	Gulf Oil Corporation's McElroy 103, Gulf-McElroy, Upton County, West Texas	12,786
1938	Continental Oil Company's KCL A-2, Wasco, Kern County, California	15,004
1944	Phillips Petroleum Company's Ada Price 1, Wildcat, Pecos County, West Texas	15,279
1944	Standard Oil Company of California's KCL 20-13, South Coles Levee, Kern County, California	16,246
1945	Phillips Petroleum Company's Schoeps 3, Wildcat, Brazos County, Gulf Coast, Texas	16,655
1946	Pacific Western Oil Corporation's National Royalties 1, Miramonte area, Kern County, California	16,668
1947	Superior Oil Company of California's Weller 51-11, Wildcat, Caddo County, Oklahoma	17,823
1949	Superior Oil Company of California's Limoneria 1, Wildcat, Ventura County, California	18,734
1949	Superior Oil Company of California's Unit 1, Wildcat, Sublette County, Wyoming	20,521



for high-speed drilling in all

for softer formations — for drilling in softer shales and unconsolidated formations, CP TYPE ES-5B ROCK BIT has teeth widely spaced for minimum contact on bottom, and deeper penetration.

The diameters and angle of taper on cones produce a combined rolling and sliding action that gives maximum drilling speed in the softer formations. Also suited for tough, sticky shales, and areas where light weight must be used to maintain a straight hole.

OTHER OIL WELL DRILLING TOOLS INCLUDE REAMING BITS, GUIDE REAMERS, TOOL JOINTS, DRILL COLLARS, ROTARY SUBS AND JUNK BASKETS.

for soft to medium formations — CP TYPE ES-5 ROCK BIT, of the same general design as the ES-5B, has more teeth, less widely spaced. It is, an all-purpose bit, suitable in very soft formations and also in harder shales, anhydrite, softer lime and broken formations. Heavy weights may be used with safety when necessary.

OIL TOOL DIVISION OFFICE: ONE N. W. 16th STREET, OKLAHOMA CITY, OKLAHOMA

In Canada: 10103 81st Avenue, So. Edmonton, Alberta, Canada • **In Mexico:** Mexico, D. F., Rosas Moreno No. 41; Tampico, Tamps., Apartado No. 174.
Special Oil Tool Export Agent: E. F. Gahan, Inc., 500 Fifth Ave., New York 17, N. Y. (West Indies, Central and South America, exclusive of Mexico)

Chicago Pneumatic has developed
a line of high alloy steel
Three Cone Rock Bits that
assure the most effective drilling
at maximum speed and footage
for every kind of formation
— soft, medium or hard.
A stock of popular sizes is available
at convenient locations.

formations

for medium formations — CP TYPE EM-4 ROCK BIT is designed for drilling in hard sands, hard shales, anhydrite, and medium-hard limestones, that are too hard or abrasive for the ES-5.

for medium to hard formations — built with strong teeth to withstand the heavy weights required in drilling rocks of high compressive strength, CP TYPE EM ROCK BIT is a general purpose bit of unsurpassed efficiency in hard limestones, dolomite, hard shales and anhydrite.

for the hardest formations — in exceedingly hard or abrasive material, including chert, quartzite and granite, the CP TYPE EH ROCK BIT is designed so the teeth exert a rolling, crushing action with a minimum of sliding. It can be used with extremely heavy weights without sacrifice of drilling speed.

WRITE FOR COPY OF BULLETIN 1001

CHICAGO PNEUMATIC
TOOL COMPANY
MANUFACTURED AT FRANKLIN, PA.
General & Export Offices: 6 East 44th Street, New York 17, N. Y.

circulating at 20,450 feet—just 71 feet short of the record—while the operator reportedly was awaiting special casing.

Besides Mississippi, there were drilling depth records set in eight other areas during 1951. Deepest was in Southwest Texas, where The Superior Oil Company's Minnie S. Welder 27, San Patricio County, went down to 17,966 for a new state record. Close behind was Magnolia Petroleum Company's Ragley Lumber 1-D, Allen Parish, South Louisiana, which was below 17,836 feet and still drilling as the year ended.

The Mississippi, Southwest Texas and South Louisiana tests combined to give the old year the distinction of having placed three wells among the five deepest ever drilled in the U. S.

Other areas that received new records in 1951 were West Texas, 15,468 feet; Colorado, 15,041 feet; Idaho, 12,844; Pennsylvania, 12,321; South Dakota, 9348; and Nebraska, 7998.

The new Pennsylvania mark is notable in that it replaced an area record hung up with cable tools in 1949 by Manufacturers Light & Heat Company's Barton Estate 8, which went to 10,312 feet. This is still the deepest hole ever drilled with cable tools.

There were no newcomers in 1951 to the ranks of the areas which have had 10,000-foot wells, but two areas stepped up into the 15,000-foot class. These were Southwest Texas, where Superior's Minnie S. Welder set an area mark; and Colorado, where Mountain Fuel Supply Company's Unit 1, Moffat County, went down to 15,041 and was still drilling.

Although it took the U. S. industry 72 years after its birth to drill its first 10,000-foot well, tests of this depth are now in minority among the record-holders of the various areas. Of those areas probed by the drill, 29 have had wells 10,000 feet or more deep and 19 have not.

Order Your Copy of 1951 World Oil Index

The complete editorial index covering all issues of WORLD OIL published during 1951 has been prepared and is bound separately in convenient pamphlet form. It will be sent free to all subscribers who write requesting copies.

Orders should be addressed immediately to the Circulation Department, Box 2608, Houston 1, Texas, as quantities are limited.

Drilling Depth Records in U. S. by States and Districts

State or District	Feet	Year	Formation	Well, Location and Remarks
Wyoming	20,521	1949	U. Cretaceous	Superior Oil Co. of California's Unit 1, Pacific Creek area, Sublett County. World's Deepest.
Mississippi	20,450	1951	.....	George Vasen et al's Tung Oil Corp. of America 1, C SW NE 9-2s-11w, Stone County. Standing.
California	18,734	1949	U. Miocene	Superior Oil Co. of California's Limoneria 1, North Montalvo area, Ventura County.
Southwest Texas	17,966	1951	.....	Superior Oil of California's Minnie S. Welder 27, Portilla field, San Patricio County.
South Louisiana	17,836	1951	.....	Magnolia Petroleum Co.'s Ragley Lumber Co. 1-D, Allen Parish, Still Drilling.
Oklahoma	17,823	1947	Pennsylvanian	Superior Oil Co. of California's Weller 51-11, in 11-8n-12w, Caddo County.
Upper Texas Coast	16,655	1945	L. Cretaceous	Phillips Petroleum Company's Schoeps 3, Millican salt dome area, Brazos County.
East Texas	16,347	1949	Smackover	Humble Oil & Refining Company's R. P. McWatters 1, Freestone County.
Lower Texas Coast	16,006	1947	Frio	The Texas Company's Yturria L & L Co. 6, Raymondville area, Willacy County.
Alabama	15,668	1949	Jurassic	Humble Oil & Refining Company's Williams 2, in 21-6n-4w, Washington County.
West Texas	15,468	1951	.....	Gulf Oil Corporation's Theo. Winfield 1, Section 3, Block 132, T&STL Survey, Pecos County.
Florida	15,455	1947	L. Cretaceous	Gulf Refining Company's State of Florida 1, Big Pine Key area, Monroe County.
South Central Texas	15,301	1945	L. Cretaceous	Quintana Petroleum Company's South Texas Syndicate 3-D, McMullen County.
Colorado	15,041	1951	Dakota test	Mountain Fuel Supply Co.'s Unit 1, Hiawatha field, Moffat County. Still drilling.
North Louisiana	14,967	1947	Salt	Cotton Valley Operators Committee's A. G. Oliphant-S. Banks 2, Cotton Valley field, Webster Parish.
New Mexico—SE	14,865	1950	Ellenburger	Humble Oil & Refining Company's Federal-Wiggs 1, in 31-24s-27e, Eddy County.
Texas Panhandle	14,278	1949	Arbuckle	Gulf Oil Corporation's E. Porter "A" 1-E, Section 413, Block 43, H&TC Survey, Lipscomb County.
Utah	13,766	1949	Pennsylvanian	Pacific Western & Equity Oil Company's Unit 1, in 33-21s-21e, Grand County.
North Texas	13,352	1947	Simpson	Denver Producing & Refining Company's Rich 1, Grayson County.
Idaho	12,844	1951	.....	Phillips Pet. Co. & Utah Southern Oil Co.'s Unit 1, NW SW SW 10-14s-30e, Oneida County.
North Dakota	12,526	1950	Granite	Plymouth Oil Company's Leutz 1, C NW NE 28-145n-89w, Medicine Butte area, Mercer County.
Pennsylvania	12,321	1951	U. Silurian	The California Company's Bennett 1, Davidson Township, Sullivan County.
Montana	11,519	1949	Cambrian	Shell Oil Company's Crow Tribal 7904-1, in 36-9s-37e, Big Horn County.
Arkansas	11,440	1948	Smackover	Stanolind Oil & Gas Company's Union Saw Mill 1, in 18-19s-24w, Lafayette County.
Michigan	11,012	1948	Cambro-Ord	Ohio Oil Company & Pure Oil Company's Reinhardt 1, West Branch field, Ogemaw County.
Washington	11,002	1947	.....	Standard Oil Company of California's Alderwood Commission 1, Snohomish County.
Nevada	10,314	1950	Silurian	Continental Oil Co. & Standard of California's Unit 1, SW NE SE 31-16n-56e. White Pine County.
North Carolina	10,054	1946	Granite	Standard Oil Company of New Jersey's Cape Hatteras 1, Dare County.
West Virginia	10,018	1941	Queenston	Hope Natural Gas Company's C. S. Gribble 2-8517, Grant District, Harrison County.
Virginia	9,936	1949	Ordovician	The California Company's Kipps Anthracite Coal Co. 1, Montgomery County.
New Mexico—NW	9,466	1945	Quartzite	Southern Union Gas Company's Barker Ute Indian 9, Barker Creek field, San Juan County.
South Dakota	9,348	1951	Granite	Shell Oil Company's J. T. Homme 1, in 13-20n-12e, Perkins County.
Oregon	9,263	1946	.....	The Texas Company's Cooper Mountain 1, Washington County.
New York	8,626	1944	Ordovician	New Penn Development Company's Harrington 1, Woodhull Township, Steuben County.
Kansas	8,243	1947	Arbuckle	Stanolind Oil & Gas Company's Feathers 1, in 15-35s-33w, Seward County.
Maryland	8,165	1941	Helderburg	William Snee's Schartzer 1, Accident District, Garrett County.
Nebraska	7,998	1951	Morrison	Gulf Oil Corporation's Nels Miller 1, C SW SW 7-12n-58w, Kimball County.
North Central Texas	7,980	1945	Ellenburger	Humble Oil & Refining Company's C. H. Tompkins 1, T&P Survey, Parker County.
Ohio	7,889	1933	Clinton	Benedum and Tree's Knowlton 1, Independence Township, Washington County.
Georgia	7,490	1944	Cretaceous	Stanolind Oil & Gas Company's J. H. Pullen 1, Mitchell County.
Illinois	7,207	1940	St. Peter	Pure Oil Company's Billington 3, in 26-1n-7e, Cisne field, Wayne County.
Arizona	6,863	1950	.....	A. S. Waddell's Unit 1, in 23-13s-24e, Cochise County.
Kentucky	6,686	1949	Knox	Pure-Ashland-I. B. Browning's M. L. Walker 1, in 22-N-24, Webster County.
Indiana	5,408	1946	Trenton	Continental Oil Company's Cooper 1-D, Griffin field, Gibson County.
Tennessee	5,750	1947	Granite	The California Company's E. W. Beeler 1, in 4-15s-29e, Giles County.
Iowa	5,305	1930	Cambrian	Oil Development Company's Wilson 1, Page County.
New Jersey	5,022	1928	Basement	W & K Oil Company's Well 1, Jackson Mills area, Ocean County.
Missouri	4,740	1941	Cambrian	Strake Petroleum Company's T. P. Russell 1, Pemiscot County.

offers you these features!

DRILL PIPE PROTECTORS

Weatherford Drill Pipe Protectors are supplied in all fields and installed quickly with the Weatherford Applicator.

U. S. and Foreign Patents pending and issued.

WELL CONDITIONS ENCOUNTERED BY DRILL PIPE PROTECTORS

1. Rough treatment coming out of and going into the hole.
2. Drilling abrasives of various sizes passing the outer diameter of the protector.
3. Wide range of temperature (from pipe rack to the bottom of the hole).
4. Oil and gases under a wide range of pressures.

HOW WEATHERFORD PROTECTORS OVERCOME THESE CONDITIONS

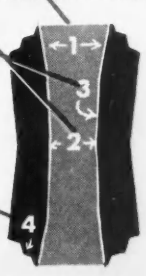
The following features are found in Weatherford Protectors only:

1. Larger inner diameter at the ends, tapering to a smaller diameter at the center. When installed, the ends of the protector will not be stretched as tightly as the center and the likelihood of tearing is greatly reduced. (Protectors lacking this feature are easily torn).

2. As the smallest inside diameter of the protector is at the center, the rubber stretched to the greatest degree is shielded from bruising by its tapered ends. This affords maximum gripping power at the middle section which expells and prevents ingress of fluids between the protector and drill pipe. Thus lubrication, which is one of the major causes of slipping on the pipe, is eliminated.

3. The inner wall of the protector, which grips the drill pipe, is perfectly smooth. Tests have proved that a smooth rubber surface against a smooth metal surface gives the best adhesion and gripping qualities.

4. The stepped and tapered design breaks the turbulence of the passing mud flow, thus protecting the pipe and protector from abrasion.



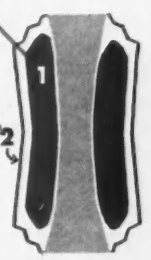
ADDITIONAL ADVANTAGES OF WEATHERFORD OIL-RESISTANT PROTECTORS

1. Natural rubber is used for the core of this protector, affording better gripping qualities and resilient durability over a larger range of temperatures.

2. Since natural rubber does not provide adequate resistance to the deteriorating effect of oil and gas a resistant cover of a different character is essential. Synthetic rubber is therefore used for the outer shell or cover, since it does resist the effects of oil and gas.

For the above reasons the Weatherford Protector, with the oil and gas resisting synthetic rubber cover, meets the deteriorating conditions encountered in oil wells more satisfactorily than does any other protector.

Therefore, we guarantee all Weatherford Oil and Gas Resistant Protectors against slipping on the pipe, the effects of extreme temperature, and the absorption of oil and gas.



We also guarantee our natural rubber protectors against slipping on the pipe and the effects of extreme temperatures, but NOT *against absorption of oil and gas.*

Sold through Supply Stores

OIL TOOL CO., *Inc.*

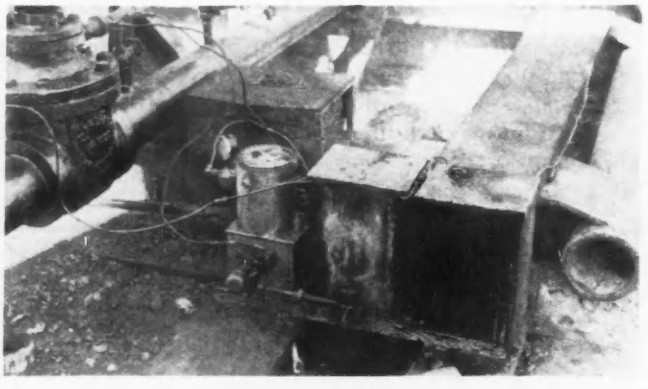
Abilene, Texas 2-3128	Longview, Texas 3291	Snyder, Texas 1326
Beaumont, Tex. 4-2842 or 4-4221	McAllen, Texas . 2014-W or 280	Victoria, Texas 3264
Corpus Christi, Texas . . 4-8266	Neconn, Texas 424	Weatherford, Texas . LD 1 or 257
Houston, Texas . Woodcrest 7411	Odessa, Texas 6-3675	Casper, Wyoming 4356

How to do it!

DRILLING HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas

HOW TO—Reduce Steam Cylinder Oil Requirements



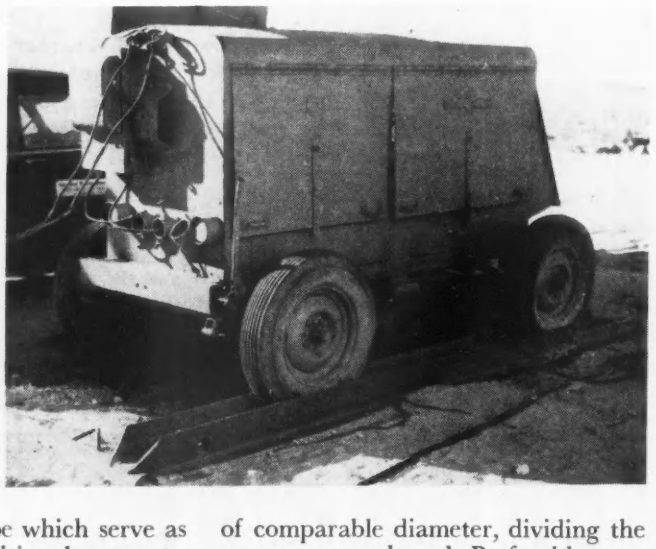
An operator reports a central steam cylinder lube dispenser has reduced the expense of 'oiling' steam by 50 percent. Before the central system was installed this operator had a lubricator on each mud pump, engine and boiler feed pump and the responsibility to fill each unit was assigned to several different crewmen. The practice resulted in considerable waste and it was not unusual to find one lubricator completely empty.

The central unit is near the master steam line leading from the generating plant and consists of a small steam actuated pump with a lube reservoir mounted on the same base. In practice, any type small steam pump will serve efficiently so long as the speed of operation and the rate of lube feed can be regulated.

In this installation, two one-quarter-inch copper feed lines are attached to a tee connection tapped in the master steam line. Each line has a regulating valve adjoining the pump, and the tee assembly has a master valve to block the entire system from the steam line. By providing the twin feed line system, it is possible to feed larger or smaller quantities of lube; or, if one line becomes blocked, the remaining line can be pressed into service to assure a continuous supply of lube to the steam system.

The assignment of maintaining and filling the lube pump rests upon the shoulders of the boiler fireman instead of several crewmen; hence, the job is carried out with increased efficiency, waste is reduced to a minimum and the live steam is always fed the desired amount of lube.

HOW TO—Build Temporary Foundation for Equipment



Sandy locations confront the operator with the problem of heavy, vibrating equipment settling and transferring stress and strain on all connecting lines. To overcome this condition, one operator fabricated the illustrated metal ramp which assures adequate and equally divided support of heavy machinery.

Structurally, the foundation consists of two lengths of pipe which serve as runners and two additional segments, of comparable diameter, dividing the runners at each end. Preferably constructed of discarded drill pipe, the foundation is rigged at each end with one-inch steel rod lifts to facilitate handling.

Two lengths of heavy gauge, six-inch plate steel welded vertically on the pipe runners guide and govern movement of the unit wheels. Each end of these retainer boards is angle-cut to prevent sharp, protruding metal which might puncture a tire.

Because the foundation is made of surplus metals, its cost consists primarily of labor charges.

Since the platform is built with a minimum vertical dimension, the problem of transporting it is relatively simple. Often, the unit is loaded on a flat bed truck first and machinery is stacked on top.

Make one call do it all!

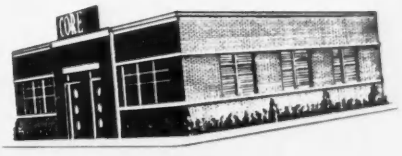
ON-LOCATION CORE ANALYSIS

STATION WAGON CORE ANALYSIS

SUITCASE CORE ANALYSIS

FROZEN CORES

SIDE WALL CORE ANALYSIS

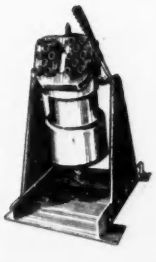


OFF-LOCATION CORE ANALYSIS

WELL LOGGING (on-shore)

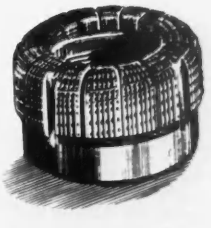
WELL LOGGING (off-shore)

WELL SAMPLING



RESERVOIR FLUID ANALYSIS

ENGINEERING STUDIES



DIAMOND CORING RENTAL SERVICE

CORE LABORATORIES, INC. ● **IN ALL ACTIVE AREAS**

Dallas, Houston, Corpus Christi, Midland, Abilene, San Antonio, Tyler, Wichita Falls, Lubbock, and Post, Texas; Oklahoma City, Oklahoma; Great Bend, Kansas; Shreveport, Lafayette and New Orleans, Louisiana; Natchez, Mississippi; Bakersfield, California; Denver, Colorado; Worland, Wyoming; El Dorado, Arkansas; Farmington, New Mexico; Calgary and Edmonton, Canada; Venezuela, S. A.

CORE LAB

PETROLEUM RESERVOIR ENGINEERING

HOW TO—

Add to Convenience Of Tool Wash Pan

A very important tool to the rig mechanic is the wash pan for cleaning engine parts and associated items; however, most wash pans are supplied without a stand and must be used on the ground or placed on a small box.

Aside from protecting the precision machined and fitted parts from abrasive contamination, raising of the wash pan to a waist high level has made the job of cleaning parts less tedious and tiring.

The unit is made of five-eighth-inch scrap sucker rods. The first step in building the stand is to heat and bend the rod into a rectangular frame approximately 9½ x 19½ inches, with the two ends welded together at one corner. The dimension of this sucker rod frame should be sufficiently large to support an 11 x 22-inch standard shop pan. The legs are cut sufficiently long to elevate the base of the wash pan about 30 inches from the floor. The legs are then

welded to the rectangular frame to provide a spread of 25 inches across the front and 18 inches across each side. At this point, the six braces are spot welded in the indicated places, the stand accurately plumbed, and then each joint is welded securely with a heavy bead.

On top and at each end of the rectangular pan well are sucker rod handles, which also act as retainers.

A coat of durable enamel completes the wash tray stand.

Utility of the wash pan is further increased by a double bottom made of 24 gauge sheet metal and perforated with 119 1/16-inch holes spaced one inch apart. After the holes are drilled, the oversize sheet of metal is turned down one-half inch on all sides to raise the tray off the bottom of the wash pan.

A work tray on top of the wash pan is made by bending a piece of 8 x 13½-inch corrugated metal along each edge so that it will slip over the top. The lower side of each recess in the corrugated metal is supplied with a drop of molten solder to expedite rapid drainage of cleaning fluid from the work area.

A final refinement of the equipment is an ordinary light bulb or an infra red heat bulb, placed immediately below the wash pan to warm the cleaning fluid in cold weather.

GEOLOGRAPH

Yes — you actually SEE formation changes, automatically recorded on Geolograph charts foot by foot, as you drill! You get up-to-the-minute, accurate drilling data 24 hours a day. That's why you save when you log as you drill, with Geolograph!

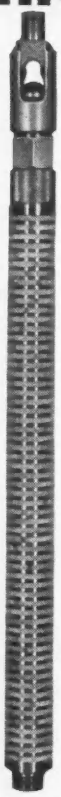
GEOLOGRAPH
MECHANICAL WELL LOGGING SERVICE
P.O. Box 1291 • Oklahoma City 1, Okla.

ABILENE, HOUSTON, ODESSA, LUBBOCK & WICHITA FALLS, TEXAS
BAKERSFIELD, CALIF. — SHREVEPORT & BATON ROUGE, LA.
CASPER, WYOMING — OKLAHOMA CITY, OKLA.

HIGH COSTS For Pump Repairs and Well Pulling

Due to Pump Trouble

ARE OBSOLETE



Save UP TO 80%
UP TO $2500.00
per year on a SINGLE well

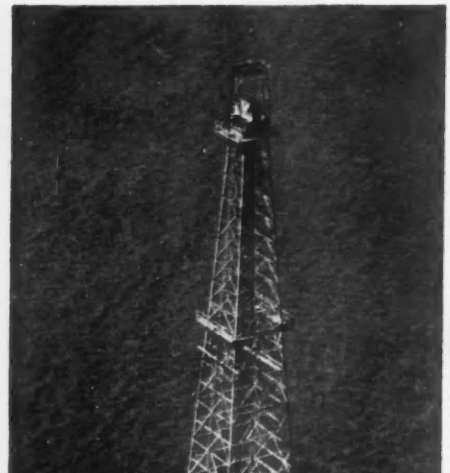
And it may not cost you a cent . . . for in many cases the MARTIN PLUNGER costs no more than the replacement of your present plunger. MARTIN CAGES, with their long life, synthetic rubber ball guides, protect balls and seats and increase savings. Ask almost anyone around Freer or Smackover, or Oklahoma City, or wherever hard pumping conditions are found.

Sold thru your supply company.

Field representatives:
E. W. Brockman, Tel. 9-3444, Oklahoma City
Don C. Davis, Tel. Wilson 8055, Ft. Worth
Tom Hulett, Tel. 3-4545, El Dorado, Ark.
L. K. Martin, Tel. 2-5317, Corpus Christi
J. L. Davis, Tel. MOhawk 4891, Houston

JOHN N. MARTIN
MANUFACTURERER
9 W. Brady St., Tulsa, Okla. Tel. 4-9415

FOR A GOOD
CEMENT JOB
SPECIFY
B and W LATCH-ON CENTRALIZER
with the NEW
KON-KAVE BOW
DROP-FORGED
FROM THE
FINEST ALLOY SPRING STEEL
AND
DOUBLE HEAT TREATED
B and W Incorporated
Well Completion Specialists
GULF COAST
P. O. Box 5266
Houston 12, Texas
WE-ntworth 6603
WEST COAST
3545 Cedar Avenue
Long Beach 7, Calif.
Long Beach 4-8366

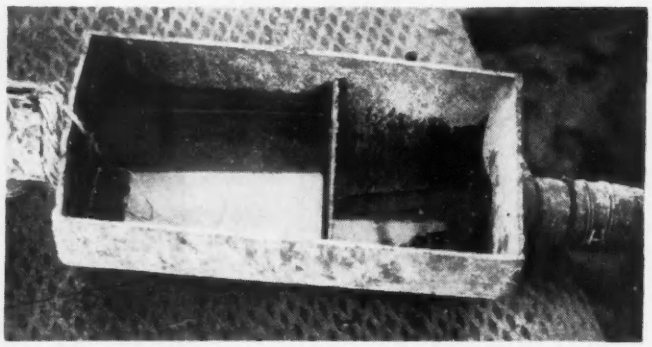


LET
Levingston
DO THE COMPLETE JOB
with the machinery of your choice

From crown block to barge bottom, Levingston is prepared to accept the entire responsibility of constructing and rigging-up your submersible drill barges on a turn-key basis. You select the tools or equipment, and Levingston's experienced organization will install them for safe and efficient operation on marine locations.

Levingston
SHIPBUILDING CO.
Orange, Texas

HOW TO—Make a Sample Catcher



The handy, effective and economical sample catcher illustrated can be rigged from a split segment of 12-inch casing sealed at each end with formed sections of one-quarter inch steel plate. Each end plate has been tapped and fitted with short three-inch nipples to permit fastening to an auxiliary line leading from the master flow pipe. A split stream of mud from the flow line is made possible by a short nipple, angle welded and equipped with a ground joint union, anchored to the side of the large pipe immediately above the shale shaker.

As mud flows through the trough, cuttings are trapped in the upstream compartment while fluid passes on to be dumped into the mud tank through a hose attached to the outlet connection on the downstream end of the sampling unit.

Ordinarily, the sample catcher is placed on the catwalk beside the shaker where it is convenient for the geologist to secure samples of the formations penetrated.

Assembled at a very low cost, this sample catcher assists in the collection of more representative cuttings and can be thoroughly flushed with comparative ease.

Rig Runner
the automatic drilling report

More and more drillers, when changing tours, are "running their swabs" from the Rig Runner chart. Toolpushers diagnose trouble . . . drilling time is recorded for geologists . . . all from the Rig Runner chart. More and more customers are finding the exact breakdown of drilling costs with Rig Runner, the only fully automatic recorder of every rig operation. Write now for proof that this sensational instrument actually saves operators and contractors thousands of dollars a year per rig!

"The Traveling Block Tells the Story"

WARREN AUTOMATIC TOOL CO.
1920 Hussion Street, Houston, Texas
Manufacturers and Distributors of Mud-O-Graf and Pit-O-Graf

EVERY OIL MAN SHOULD READ THIS EXPOSE'

an understanding of oilfield atomic energy in 5 minutes reading time

You can't fool all of the people all the time . . . not even with wild claims. So, let's call a spade *a spade!* Let's see why these wild claims are never supported by some plain, honest-to-goodness, understandable *facts* on the science of atomic energy as employed in well logging. Then, *you* be the judge!

use of a small ionization chamber to obtain the so-called Neutron Log (but which, actually, is a Neutron/*Gamma* Log) . . . whereas PGAC enjoys patent protection in the *exclusive use* of the afore-mentioned Slow-Neutron counter to obtain a "pure" Neutron/Neutron log.

The ionization chambers used in all competitive Neutron logging, are responsive only to Gamma Rays of various types—not to Neutrons of any type. Neutron/Gamma Logs are intended to reflect the detection of *secondary* Gamma Rays-of-capture ONLY (which result from Neutron bombardment of the formation being logged) . . . and it should be remembered that this *secondary* Gamma radiation is the only phenomenon which can be utilized by competitive methods to obtain their Neutron/Gamma logs. It is a scientific fact, however, that the logging of this one phenomenon *alone* is utterly impossible, because two other phenomena are *always* present—and these other two are decidely detrimental to obtaining an accurate Neutron curve.

The first of these two detrimental phenomena is the *natural* Gamma radiation from the formation being logged. Under normal logging conditions, this *natural* Gamma radiation may be of low magnitude and not present too much of a problem. However, many instances are known where strong *natural* radiation from the formation being logged could overshadow the vital *secondary* Gamma radiation and cause an erroneous log.

The second detrimental phenomenon is the strong, scattered, *primary* Gamma radiation which results from the Neutron source itself, simply because there is always a very strong radiation of Gamma Rays present in the bombardment source. To prevent this strong *primary* Gamma radiation from completely blocking out the *secondary* Gamma radiation — from which the log must be obtained — all competitive Neutron logging instruments are forced to use a shielding between the Neutron bombardment source and the ionization chamber obtaining the phenomenon. And right here another crux of the problem arises!

Due to the necessarily limited diameter of the logging instrument lowered into the hole, it is impossible to effect *complete* shielding between the Neutron source and the ionization chamber. Consequently, Neutron/Gamma curves recorded under all competitive methods are affected by this detrimental *primary* Gamma radiation to a greater or lesser extent, *depending upon variations in the size of the bore-hole,* as well as upon other conditions encountered therein. Therefore, and naturally enough, the Neutron/Gamma curve may lack clear definition, and the interpretation of the faulty curve may reflect conditions inconsistent with the true formation facts.

Reasons for PGAC's *Pin Point Accuracy*

Since the exclusive PGAC Slow-Neutron counter is not responsive to Gamma Rays *of any type,* no shielding against them is necessary. And since the PGAC counter is not responsive to Fast-Neutrons either, no shielding is even required against the Fast-Neutrons that may go from the bombardment source directly to the counter. With only those Neutrons which have been slowed down by traversing the formation being detected by the PGAC counter, *the reason* for the clear definition and superiority of our Neutron/Neutron curve becomes obvious.

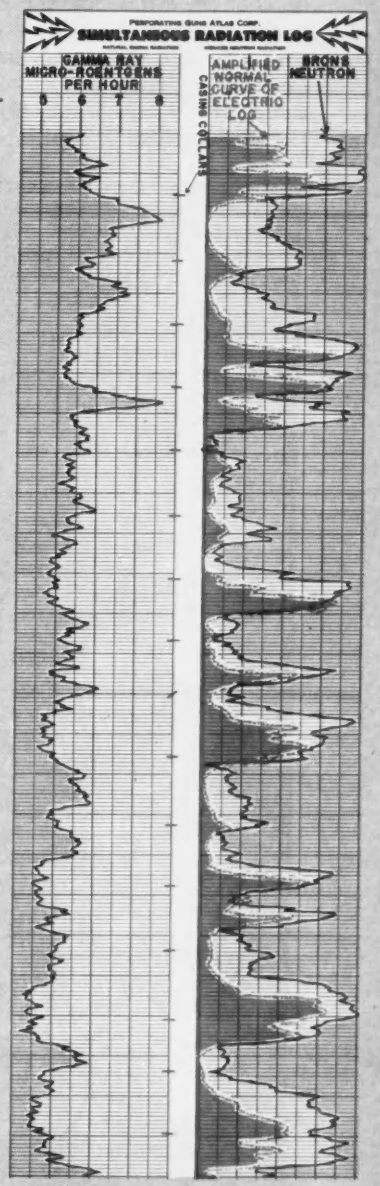
Because of these many exclusive PGAC features, no other radioactivity log can possibly equal PGAC's SIMULTANEOUS RADIATION LOG. And remember too, only the Perforating Guns Atlas Corporation offers this proved superiority in *Accuracy, Stability, Reliability, and Economy.*

So, play it safe . . . always call in PGAC to run a Radiation Log on your well — you'll get a better log, better service — and you'll save 60% of your rig down-time!

PGAC Automatic Correlation – like marriage – Sure Prevents Human Errors!

AUTHENTICATION!

Substantiation of these *behind-the-scenes* facts may be found in the new technical volume, "Principles of Petroleum Geology," by Wm. L. Russell, Associate Professor of Geology at Texas Agricultural & Mechanical College. Any additional data you desire may be obtained without obligation by writing PGAC for answers to your specific questions.



Another example of PGAC's outstanding correlation (of a Neutron/Neutron curve with the electrical log) in an area where, previous to PGAC's Simultaneous Radiation Logging, correlation was very difficult — if not impossible.

PERFORATING GUNS ATLAS CORPORATION

General Offices and Main Plant: 3915 Tharp Street, Houston 3, Texas, Telephone: PReston 4351

OIL FIELD SERVICES BY PGAC

Simultaneous Radiation Logging, Gamma Ray Logging, Brons Neutron/Neutron Logging, Electrical Logging, Jet Shot Perforating, Bullet Perforating, All Wire Line Services, 24-Hour Service From All Stations

Canadian Affiliate: PERFORATING GUNS OF CANADA, LTD., Edmonton, Alberta, Canada

HOW TO—

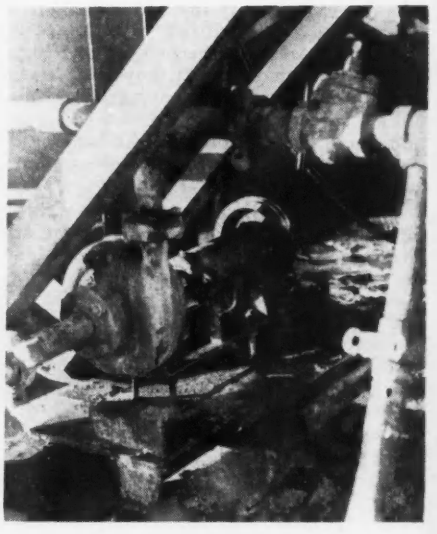
Supply Drawworks Brake Cooling Water

An adequate and continuous supply of cooling water for the drawworks brake may be provided by a belt driven centrifugal pump anchored to one of the base beams of the substructure. Often, water for this purpose is supplied by a pumping system powered by an independent engine or electric motor on location; however, one quick-thinking contractor eliminated the independent power unit by belt driving the supply pump from a pulley attached to the engine compound. Water is delivered to the brake as long as the engines are running and the system is automatically forced out of service the minute the engines discontinue operation.

A section of three-eighth-inch steel plate is welded across one of the substructure base beams. Additional support of the plate is provided by anchoring the remaining side to pipe extending through the structure system.

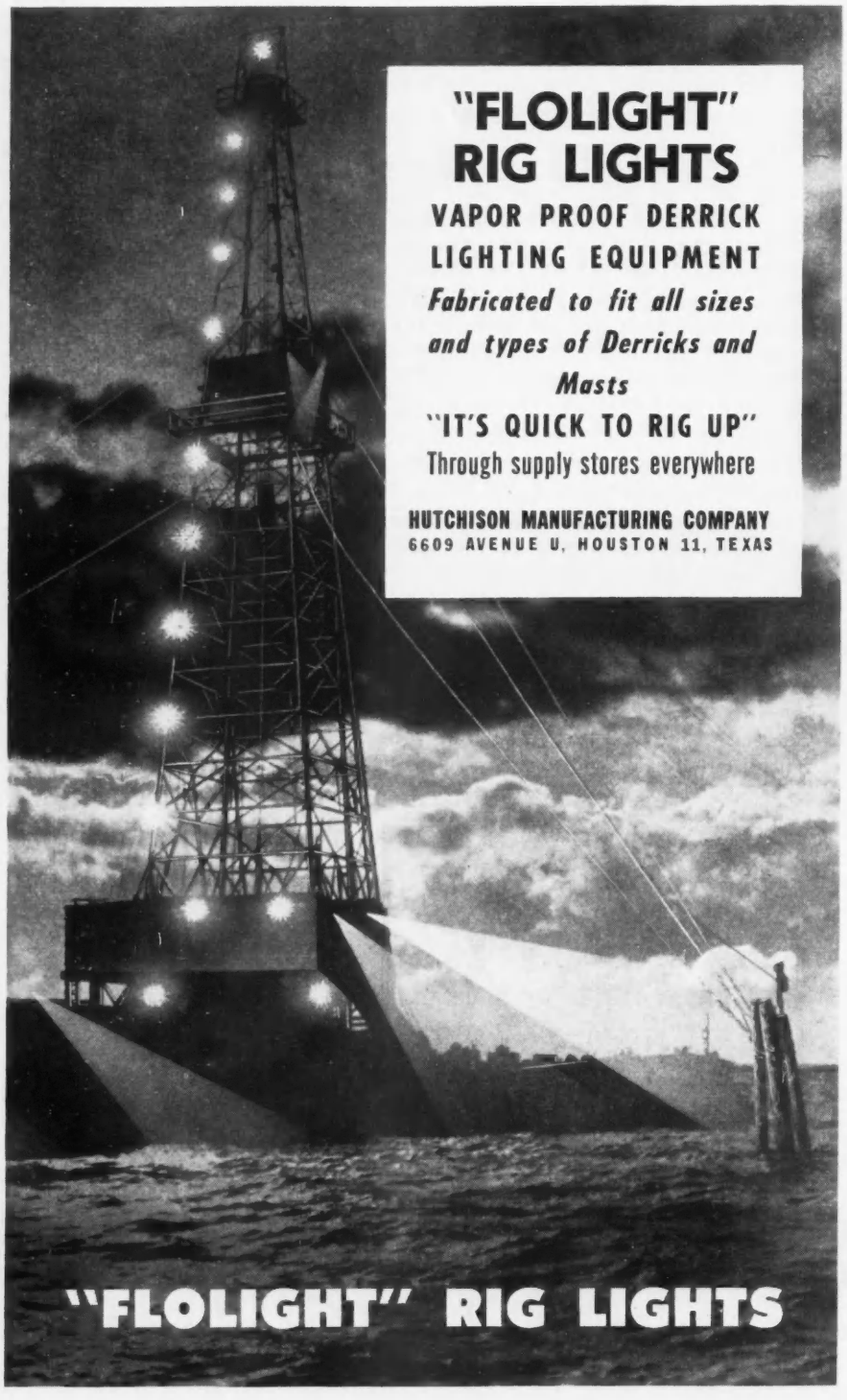
Once the metal plate is properly secured, a platform plate, slightly larger than the over-all dimension of the pump and pulley base, is welded to the master anchor plate previously attached to the substructure base beam. This platform is elevated about three inches above the master plate to permit insertion of anchor bolts. The four anchor bolts, installed with the caps looking down, are locked in place by means of four nuts jammed against the face of the platform plate. Placement of the anchor bolts is governed by the dimension of the pump and drive pulley base.

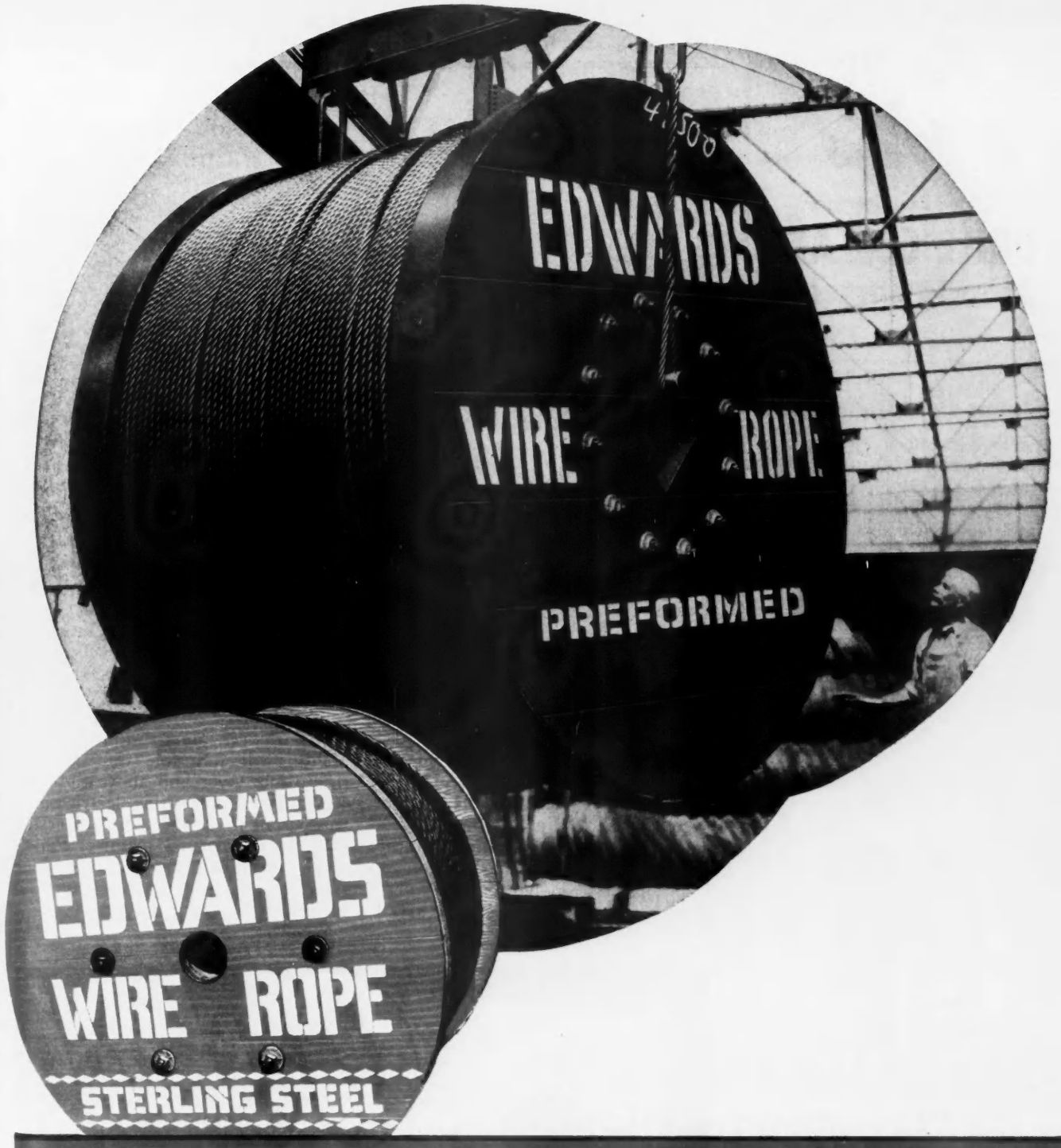
These four heavy duty bolts serve as adjustable legs for the belt driven pump and pulley assembly. Holes penetrating the base plate of the pump and pulley assembly accommodates these four adjusting legs.



Completion of this permanent anchoring base for the water pump, shaft and drive pulley finishes the job except for installing a pulley on one of the compound shafts immediately above. In all probability, it will be found that the pulley can be installed on a backboard compound shaft.

Installation of the two V-belts and application of tension by means of the adjustable legs provides the operator with a dependable supply of cooling water independent of auxiliary power requirements. Often the complete assembly, except for the V-belts, can be left intact for rig moves. For further flexibility and utility, each line attached to the pump has quick coupling, hammer type unions.





YOU CAN BET YOUR LIFE ON

EDWARDS
WIRE ROPE

Head Office: SAN FRANCISCO • Main Plant: SOUTH SAN FRANCISCO

Branch offices

SEATTLE • PORTLAND • LOS ANGELES • HOUSTON

Distributors throughout the West, Gulf Coast and Mid Continent

Profit 2 Ways

by making Lone Star your

DRILL COLLAR Headquarters

1

Immediate Delivery

When you need drill collars, speed is paramount. Lone Star's complete stock, and Lone Star's 39-year-old reputation for dependable service, are your assurance of the quickest possible delivery. Place your next order with Lone Star!

2

Lone Star's Improved Build-Up Process

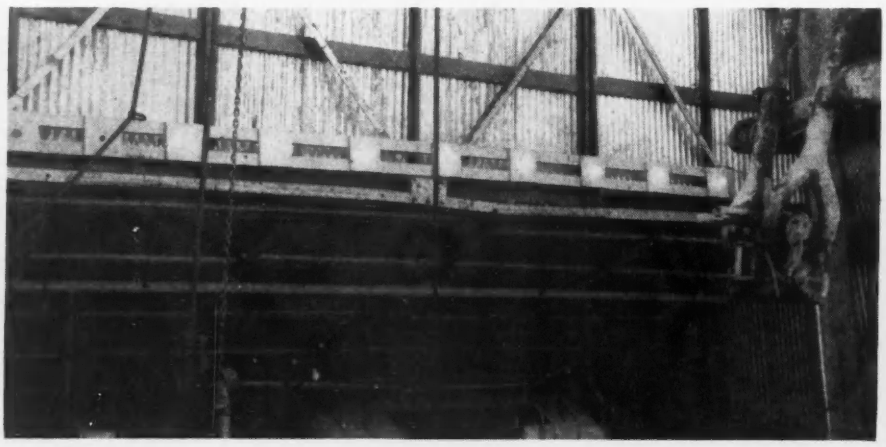
Lone Star's improved, automatic build-up process, performed at the plant, means certainty of uniform, faultless workmanship . . . and Lone Star's process is faster, therefore less costly. Write for complete information.

LONE STAR TOOL CO.

P. O. Box 848

WICHITA FALLS, TEXAS

DRILLING HINTS



HOW TO—Light Up Derrick Floor

Construction of simple, wooden socket retainers will expedite the process of rigging bulbs around the derrick floor and will supply more adequate lighting within the area. Many operators concentrate on the complete unitization of all heavy equipment on a rig and continue to attach floor lights to the first girts with baling wire. Explanation of this practice is not difficult since rigging lights is one of the so-called minor operations around a rig; however, the makeshift system often requires the investment of accountable time during the process of rigging-up.

A good deal of time can be saved by construction of the simple panel illustrated. Built on one-inch lumber, the panel is rigged with ten light sockets and quick coupling junctions at each end. Secure anchorage is provided by means of four J-bolts clamping the panel to the girts.

The expense of this light-weight unit is quite nominal and, in all probability, will pay for itself on one rig-up job. Over and above the item of rig-up economics, this electric panel will permit the lighting of the derrick floor in any desired manner. Panels can be installed on two, three or four sides; depending upon the choice and requirements of the operator.

Gotkool
water cans and coolers
GOTKOOL WATER CAN
Made in 1½, 2, 3, 5, 10, 15 and 20 gallon sizes. Push-Button Faucet at slight additional cost.
KEEP PURE DRINKING WATER ALWAYS HANDY
GOTKOOL WATER COOLER
Made in 2, 3, 5, 8, 10, 15 and 20 gallon sizes with Push-Button Faucet.
GOTT Water Coolers are the convenient way to keep drinking water handy to the worker, protect it from impurities. Their exclusive construction keeps water cool for long periods. Snug-fitting, large, removable top, handy non-leaking push-button faucet. GOTT Water Cans for handy field use. Your supply store has them, get one today!
STANDARD OF THE OIL FIELDS
Insist on the Genuine
GOTT
PURE WATER
H. P. GOTT MFG. CO.
WINFIELD, KANSAS

A TOUGH washover job

solved with DIAMONDS!

Call on D&S and Truco for your washover jobs.

Approximately 2250 feet of 2⅞" drill pipe was cemented in 5-inch 29# casing below 9000 feet. Seven diamond washover shoes cut over the 2250 feet of drill pipe, averaging 321 feet each washover shoe.

Fifty-eight tool joints were cut as shown above and one side of several joints of pipe shaved off full length. Diamonds were resorted to after other means failed to make progress in recovering the fish.

Drilling & Service

3031 Elm Street — Dallas 1, Texas

OFFICE PHONE: RIverside 6811
NIGHT NUMBERS: TRemont 5559, VIctor 3708, DIxon 4176

Other Offices — Services

Tyler, Texas 2-2742
Odessa, Texas 6-6774
Abilene, Texas . . . 2-2790
Victoria, Texas 3264
Norman, Okla. 4360
Shreveport, La. . . . 5-5474
Casper, Wyo. 3739
Carmi, Ill. 7799
Ft. Morgan, Colo. . . . 1143
Great Bend, Kans. . 7585

Distributors

Diamond Drilling Co., 2759 E. Willow St., Long Beach, Calif., Telephone: Long Beach 40-7949

Allied Services, Inc., Mt. Pleasant, Michigan Telephone: 29-861

Foreign

D. T. O'Connor, 500 Fifth Avenue, New York, N.Y.
Petroleum Industry Consultants, C. A., Caracas, Venez.
Denton-Spencer Co., Ltd., Calgary, Alberta, Canada.

FASTER

and a lot

SAFER, too!

Ropes and chains and tongs and wrenches around your pump suction just don't make sense when you can use a BEMCO Suction Hoist and get the job done faster . . . and safer . . . and with complete assurance that the suction will stay at the depth you want it. BEMCO Suction Hoists are light, easy to handle and completely safe. They're made in two styles, for single or double suctions.

BUY BEMCO Suction Hoists . . . and return those tongs and wrenches to the derrick floor where they belong.

L&H MACHINE WORKS
2205 Quitman Houston, Texas
EXPORT: Baird Supply Co., Inc.
420 Lexington Ave. New York, N. Y.

Be sure the connections ARE LEAK PROOF!

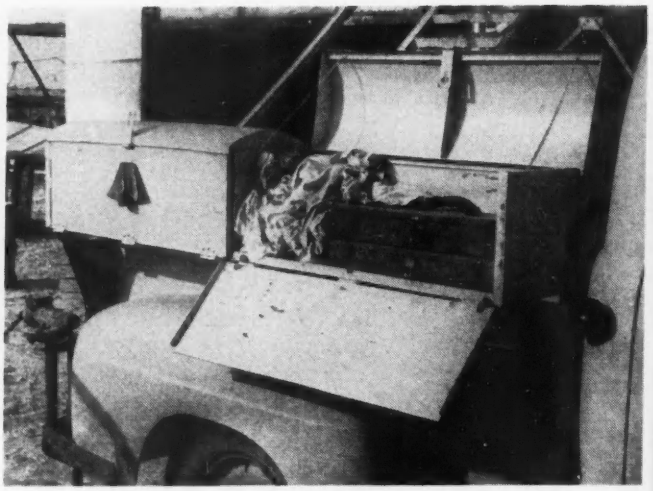
Make them up with RECTORSEAL!

• You'll never have to worry about connection leaks on Fuel, Water and Air Lines; Tubing and Casing connections when you make them up with RECTORSEAL. Apply Rectorseal directly from the container. It sets-up quickly to a plastic elasticity that positively seals the connection . . . and keeps it sealed until broken-out.

Ask for Rectorseal by name at your Supply Store. If they can't supply you, write RECTORSEAL, Dept. G
2215 Commerce St., Houston 2, Texas

RECTORSEAL
Manufactured by
RECTOR WELL EQUIPMENT CO., INC.
Fort Worth, Texas
MAKING THE OIL INDUSTRY SAFER

HOW TO—Rig Truck Tool Boxes



Expensive rig mechanics' tools will be given adequate protection by weatherproof carrying racks mounted alongside the bed of a pickup truck. The racks provide the mechanic with an efficient means of not only protecting, but arranging tools in a handy and convenient manner.

Each case is rigged with a drop side door and a sealing, trunk type lid, both of which are secured with padlock hasps. The sealing element of the doors is formed as a dove-tail joint capable of blocking the entrance of rain or dirt. Light weight chains govern movement of the top door so that it will not drop back into the pickup bed when the chest is opened.

Since the cases are locked with loose, tumbler type units, segments of heavy gasket material are placed behind the locks to prevent damage to the outer face of the tool box.

A small vise is mounted on an extension anchored to the heavy duty bumper at the rear of the pickup bed. Either heavy angle iron or pipe can be used as the support post for the vise, and flat iron braces against the trunk bed assure proper anchorage.

The complete assembly can be made at minimum cost and, since the arrangement assures a special, protected place for each tool, loss of this expensive equipment will be minimized.

Complete Equipment • Efficient Service

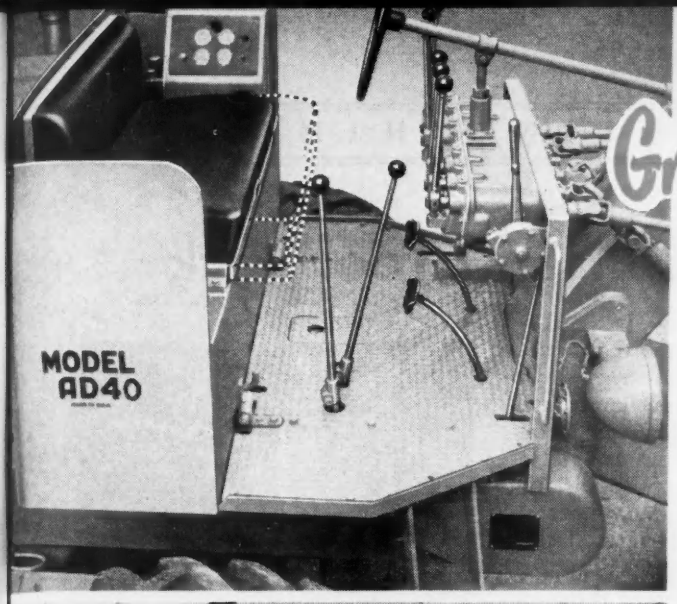
Pictured is one of our heavy-duty oil field hauling trucks. Over 24 years experience guarantees you fast, efficient hauling service.

HELDT TRUCKS

Fully Bonded • Fully Insured

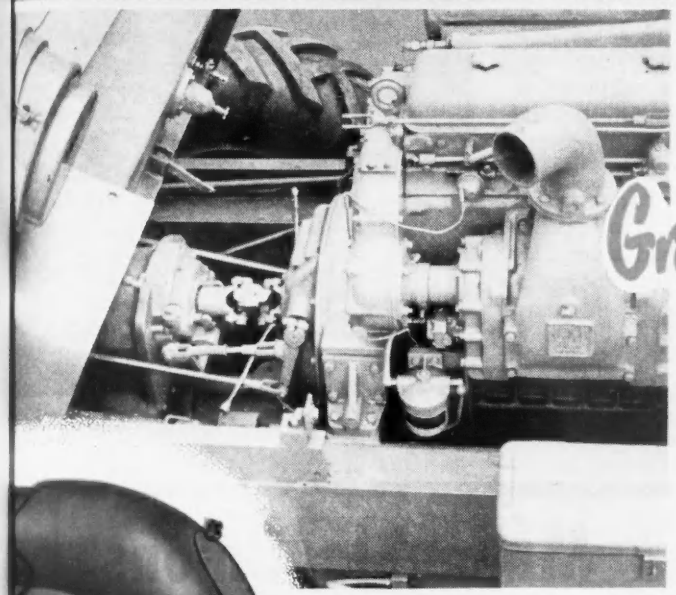
HELDT BROS., Trucks

ALICE Phone 1376 | FREER Phone 2511 | SULLIVAN CITY Phone 11



Great New operating ease

No other grader has been designed with the operator more in mind. **Unmatched Visibility**—Single tubular frame from front to platform, new lift cases, low control box and tapered platform give operator a full view of what he is doing. **Feather-Touch Steering** — New hydraulic booster system, fully enclosed in the frame, provides effortless steering with positive control even under toughest conditions. **All-Around Comfort**—Roomy platform, adjustable seat (as shown) and simple controls offer any size operator true comfort—sitting or standing.



Great New service simplicity

Here's maintenance and repair accessibility second to none. Combined fuel tank and seat unit tilts forward for easy access to clutch, transmission and drive shaft. Transmission can be removed without disturbing floor plates. Power take-off and hydraulic pump are mounted outside the dash.

Great New performance

Add these outstanding operator and service advantages to the exclusive Allis-Chalmers features that include ROLL-AWAY* Moldboard — extra high clearances from front to rear — shock-absorbing tubular frame—dependable General Motors 2-Cycle diesel power . . . and you have the finest heavy-duty grader on the market. Get the full story on this new AD-40 from your Allis-Chalmers dealer now.

**ROLL-AWAY is an Allis-Chalmers Trade-mark.*

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Designed for Your Job • Built to Take It • Easy to Operate • Easy to Service

SLUSH PUMP LINERS

RE-BORED

TO ANY STANDARD SIZE
— WE DO THE JOB —
— RIGHT! —

NEW LINER GUARANTEE
65%
OF NEW LINER COST

Our Representative
Will Be Glad to Call
Write to

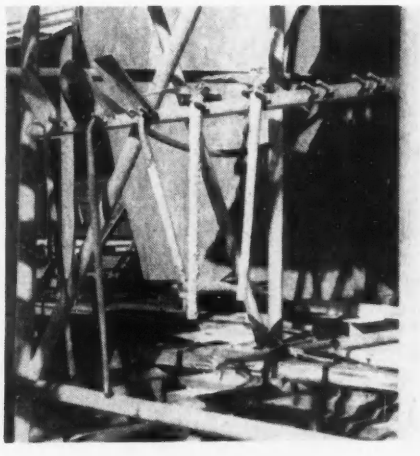
WICHITA TOOL REPAIR CO.
104 Oak, P. O. Box 511
WICHITA FALLS, TEXAS

HOW TO—Build Hand Tool Rack

The cross brace on the tool house, fuel tank or water tank support can be easily converted into a handy rack for picks, shovels and miscellaneous hand tools required around a rig. If there is not a brace of the desired height, a section of two-inch pipe can be welded between the vertical supports of one of the platforms.

Retaining pins to support the hand tools are made of derrick bolts tack welded along side the horizontal bar. By providing sufficient supports to hold all hand tools around the rig, the driller can account for all equipment with comparative ease.

A program for proper care of hand tools affords the operator interesting dividends. The haphazard system of throwing hand tools on the floor of a storage house often results in many losses and damage to the equipment. However, if the hand tools, particularly shovels, are always stored on a visible rack, the condition of each tool and the stock of equipment on the rig can be readily ascertained. A definite place to store these tools will encourage the drilling crew to accept the policy of "good-housekeeping" and proper maintenance of important equipment.



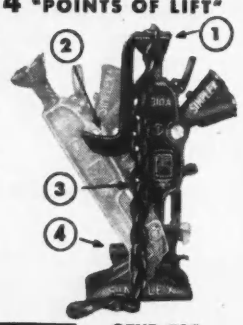
4-WAY LIFTING POWER with this SIMPLEX 310-A EMERGENCY JACK

Powerful 310-A Simplex EMERGENCY JACK is easy operating, will lift vertically or push or lift in any position.

"Get the Simplex" is the call on drilling jobs when men want quick, safe jack action. The double lever socket enables them to work in close quarters and at any angle.

This 15-ton Ratchet Lowering jack will lift or lower from four points—on the rotary cap, on the auxiliary cap shoe, on the serrated toe lift, or from any intermediate height by using the chain as a sling.

4 "POINTS OF LIFT"



Simplex
LEVER · SCREW · HYDRAULIC
Jacks

SEND FOR BULLETIN: OII 48

TEMPLETON, KENLY & CO.
1032 S. Central Ave., Chicago 44, Ill.

Jefferson Malleable Unions

STYLE "B"

JEFFERSON Style "B" three-piece flange union is made with brass-to-iron and iron-to-iron seats. Being made of highly refined AIR FURNACE iron. it assures you of lightweight construction, perfect ball joint, and positive seating arrangement, whether or not in alignment.

★ ★ ★

HYDRAULIC PRESSURE RATING

Sizes	Test Pres.	O. W. G.	S. W. P.-550 Deg.
½" thru 4"	2000#	800#	250#
5" and 6"	1200#	500#	250#
8" and 10"	1000#	400#	250#

Malleable iron used in all JEFFERSON unions meets ASTM 4733, Grade 35018—M. T. 53000 Lbs., giving 75% more elongation 50%-more impact value and is 30%-stronger than cupola malleable iron.

Obtainable through your jobber

Jefferson Union Company, Inc.

691 West 26th St.,
New York 1, New York

71 Gooding St.,
Lockport, New York

31 Fletcher St.,
Lexington, Mass.

Artificial Lift

Equipment for 22,441 Wells Is Forecast

By J. E. KASTROP
WORLD OIL Staff

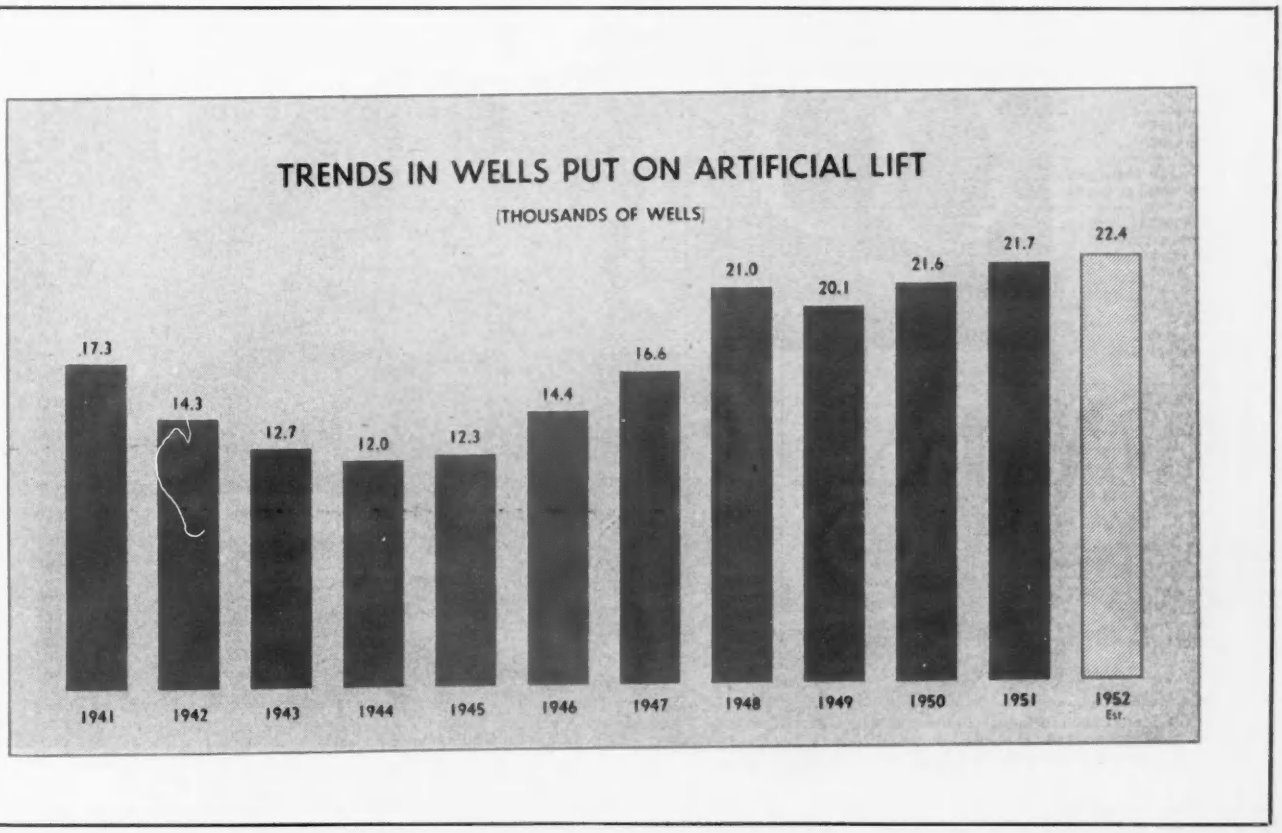
MORE U. S. wells will be equipped during 1952 with artificial means of producing oil than in any previous year. It is estimated that 22,441 wells will require some form of artificial lift this year. This total includes down-the-well pumps actuated by sucker rods, hydraulic-type units, gas-lift, and all other electrical or mechanical methods of lifting fluid from subsurface levels.

The number of wells to be placed on artificial lift this year will be 690 more than last year. It is even greater than the previous record high of 21,940 wells in 1950. However, such an increase should be expected when the factors to be considered are evaluated. Total number of oil well completions have a definite influence upon the number of wells placed on artificial lift each year. Since more wells are expected to be drilled this year than last, it is logical to assume that there will be more oil well completions (this does not take into account gas or gas-condensate wells which require no means of artificial lift). In 1951, a total of 44,826 wells were drilled to bring in 23,179 oil producers. During this period, 21,751 wells went on artificial lift Within limitations, there is some degree of correlation.

Other Factors

However, there are other factors which must be considered. In many of the older areas and in some of the newer low-pressure sections, marginal flowing wells are constantly being placed on the pump, gas-lift or other means of lifting oil. This trend in some areas is more pronounced than in others. Water-flooding, more widespread today than ever before, has extended the flowing life of many wells. In some instances, the effect of water-flooding has been so great that wells began to flow again under the influence of the increased reservoir pressure.

In other areas pumping and flowing wells were shut in due to the lack of pipe line facilities (such as in West Texas) and lack of markets (as in the Rocky Mountains and Mississippi). When these conditions were altered in the past year, shut-in wells were placed on production. The demand for oil and current prices, with some prospect of a price increase, has had an effect on abandonments. Operators can afford to work over marginal wells or produce them at a relatively high cost so long as a profit



can be shown. Should a substantial price increase be granted this year, more shut-in wells can be expected to go back on production, and many marginal wells kept on the active list.

This situation was particularly noticeable in Mississippi, Nebraska, West Texas and Utah. The number of shut-in wells placed on production was so large in these areas that the increase noted in oil producing wells exceeded the number of new oil wells completed; thus, the net abandonments or wells shut-in was zero.

In some areas, all new oil wells completed or a large portion of them were placed immediately on artificial lift. This was true for Pennsylvania, New York, the Texas Panhandle, Illinois, Kansas, Kentucky, Alabama and West Virginia.

More than 73 percent of all wells to go on artificial lift in 1952 are located in four states: Texas, Oklahoma, Kansas and California. West Texas continues to lead the Lone Star state with 2872 wells slated for artificial lift. The forecast of 3055 wells for Oklahoma is lower than last year's figures because of two things: (1) water-flood projects; and (2) a slight decrease in projected drilling in 1952. Kansas, always a big pumping state, will see 2245 wells go on artificial lift, while California will have about 2000 wells in this category.

There has been a tendency to install complete pumping units in advance of their need. This practice has been encouraged by past labor strikes and steel shortages and as a protective measure to minimize the shut-in days of any producing well due to lack of equipment.

Order Your Copy of 1951 World Oil Index

The complete editorial index covering all issues of WORLD OIL published during 1951 has been prepared and is bound separately in convenient pamphlet form. It will be sent free to all subscribers who write requesting copies.

Orders should be addressed immediately to the Circulation Department, Box 2608, Houston 1, Texas, as quantities are limited.

Maintenance Costs

The industry is expected to spend a little over $52 million in materials and parts alone to maintain oil producing wells on artificial lift during 1952. This is an increase of 17.4 percent over 1951 costs. While the estimated average number of wells to be maintained increased to 434,767 for 1952, the largest part of this increase resulted from the increase in prices paid for these items. In estimating these material and equipment parts to maintain artificial lift wells in the U. S., only half the number of wells anticipated to be placed on artificial lift were added to the total artificial lift wells in the U. S. at the end of 1951. It is logical to assume that only half of the wells going on artificial lift during the year would do so in the first six months, with the net effect that only half the total would require maintenance over the entire year.

Estimate of 1952 Artificial Lifting Equipment Needs

(Includes requirements for all types of pumping units and also air/gas lift units)

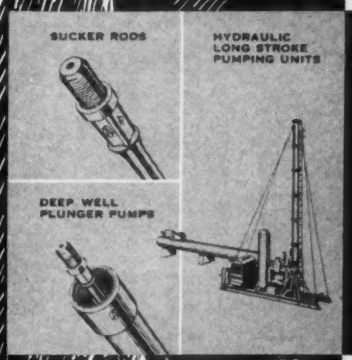
STATE or DISTRICT	Estimated Number Wells To Go On Artificial Lift During 1952	Wells Put On Pump or Lift in 1951	New Oil Wells Completed In 1951	Number of Flowing Wells End Of 1951	Number of Net Wells Abandoned or Shut-in During 1951	Estimated Average Number Art. Lift Wells To Be Maintained During 1952	Estimated Maintenance Cost (Equipment Only) For all Art. Lift Wells in 1952
Alabama	6	17	17	0	0	78	$ 6,864
Arkansas	267	284	235	312	221	3,463	380,930
California	2,000	1,887	1,678	1,934	194	28,656	11,462,400
Colorado	188	169	113	135	41	794	109,572
Illinois	839	921	917	12	1,161	33,293	3,196,128
Indiana	422	447	453	18	171	4,433	390,104
Kansas	2,245	2,133	2,105	45	1,011	32,338	3,557,180
Kentucky	465	470	501	36	206	15,757	1,512,672
Louisiana	1,098	1,166	1,106	3,417	727	8,655	1,083,075
North Louisiana	672	742	598	420	355	6,900	793,500
South Louisiana	426	424	508	2,997	372	1,755	289,575
Michigan	205	212	226	155	59	3,833	463,793
Mississippi	254	298	124	126	†0	1,593	280,368
Montana	163	143	145	22	41	3,270	451,260
Nebraska	63	74	52	27	†0	213	33,015
New Mexico	357	312	363	3,283	141	2,947	810,425
New York	298	317	317	0	317	23,349	1,167,450
Ohio	316	322	322	50	422	19,808	89,440
Oklahoma	3,055	3,130	2,995	1,605	1,501	58,243	6,406,730
Pennsylvania	682	634	634	0	534	82,641	3,718,845
Texas	8,937	8,243	10,313	44,051	3,349	90,684	15,360,283
Dist. 1: South Central	339	333	301	238	125	3,876	534,888
Dist. 2: Middle Gulf	369	346	299	3,162	148	1,613	258,080
Dist. 3: Upper Gulf	839	876	868	5,023	313	5,858	808,404
Dist. 4: Lower Gulf-S.W.	436	431	867	4,926	274	6,200	954,800
Dist. 5 & 6: East Central & Northeast	986	977	665	13,458	724	13,998	2,799,600
Dist. 7-B & 9: North Cenrtal & North	2,760	2,412	2,739	2,980	1,603	30,066	5,291,616
Dist. 7-C & 8: West Central & West	2,872	2,514	4,220	14,239	†0	21,237	3,631,527
Dist. 10: Panhandle	336	354	354	25	162	7,836	1,081,368
Utah	13	8	7	4	†0	45	4,950
West Virginia	87	93	93	0	293	15,044	797,332
Wyoming	481	471	461	313	66	5,532	763,416
Other States[1]	0	0	2	3	5	98	10,430
Total United States...	22,441	21,751	23,179	55,548	10,460	434,767	$52,056,662

[1] Other States include: Florida, Missouri, North Dakota, Tennessee and Virginia.
States marked (†) showed no net abandonments due to inactive wells put back on production plus new oil wells completed during 1951 exceeded the increase in producing oil wells during 1951.

"Time IS THE MOST VALUABLE THING THAT A MAN CAN SPEND"

THEOPHRASTUS

The 60 year story of AXELSON is the story of growth from an original $1200 investment into a world wide, multi-million dollar business. This time has meant an opportunity to grow with the Petroleum Industry and to gain a mature understanding of its needs and problems. Consequently, AXELSON, within its own expanding organization, has followed a policy of constant technical research which has assured the Industry of highest standards of quality in scientific design, on long lived materials and precision craftsmanship. AXELSON deep well pumps, sucker rods, hydraulic long stroke pumping units and related accessories are used in oil fields throughout the free world—a fact that attests to AXELSON quality through *time* well spent.



OUR 60th YEAR
1892 1952

AXELSON
PETROLEUM PUMPING EQUIPMENT

AXELSON MANUFACTURING CO. • PLANTS — Los Angeles 58, St. Louis 16
OFFICES — New York City 7; Tulsa 1; Buenos Aires, Argentina • DISTRIBUTORS — Jones & Laughton Supply Co.; Great Northern Tool & Supply Co.; Industrial Agencies, Ltd., San Fernando, Trinidad, B. W. I.; Industrias Waldrip & Campbell, Barcelona, Caracas and Maracaibo, Venezuela; South American Supply Co., Ltd., Lima, Peru, Sociedad Comercial de Materias Primas Limtado, Rio de Janeiro, Brazil; G. Saavedra e Hijos, S. de R. L. Avenida Morelos 31, Mexico, D. F., Dominion Oil Field Supply Co. Ltd. Calgary, Canada

U.S. Crude Production

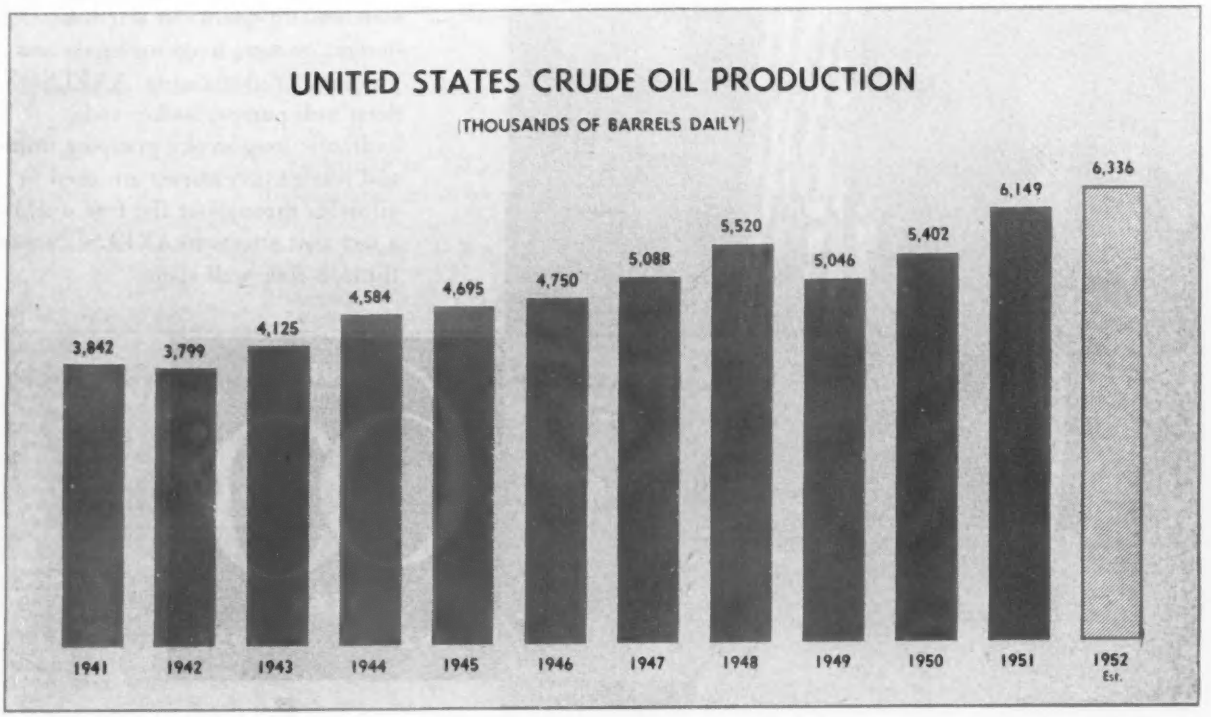
Due for Another Record Year

PRODUCTION of crude in the U. S. during 1951 was substantially greater than ever before, but prospects are for further growth and another record volume during 1952.

Production in 1952 likely will total at least 2,319,000,000 barrels, which would mean a daily average yield of 6,366,100 barrels or 187,000 barrels a day more than was produced last year. These estimates are on the conservative side and may be exceeded.

Production in 1951 took one of the sharpest gains in history, the daily average yield of 6,149,100 barrels being 13.8 percent and nearly ¾ million barrels above 1950 and in contrast with the former peak of 5,519,000 barrels per day in 1948. The very rapid growth in U. S. producing rate is illustrated by the fact that 1947 was the first year in which output exceeded 5 million barrels per day in a year. The first year in which more than 4 million barrels daily was recovered was 1943.

An unusually large increase in demand, of course, was an important factor in the big production gain in 1951. However, another significant factor was the failure of imports of foreign produced crude to continue their upward trend, a condition which made it necessary to depend on domestic production to satisfy the en-



(All Figures in Barrels)

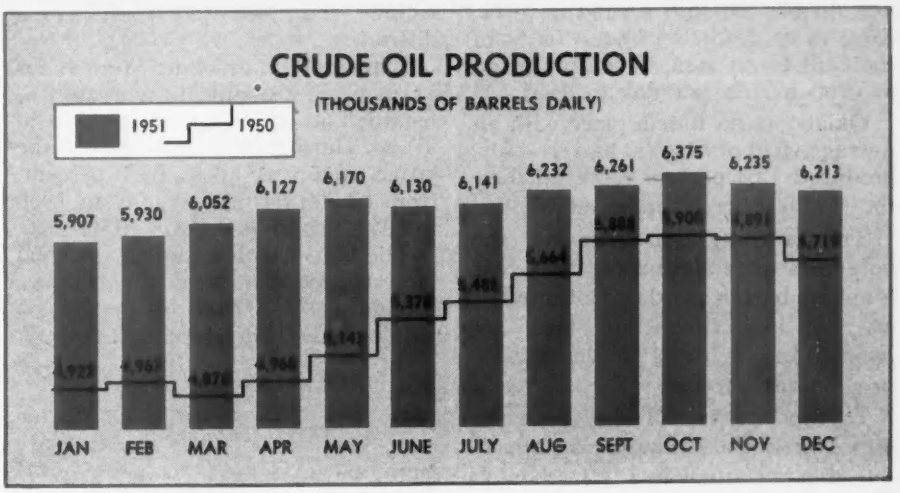
YEAR	Yearly Total	Daily Average	YEAR	Yearly Total	Daily Average	YEAR	Yearly Total	Daily Average
1918	355,928,000	975,000	1930	898,011,000	2,460,000	1942	1,386,645,000	3,799,000
1919	378,367,000	1,037,000	1931	851,081,000	2,332,000	1943	1,505,613,000	4,124,900
1920	442,929,000	1,213,000	1932	785,159,000	2,151,000	1944	1,677,904,000	4,584,400
1921	472,183,000	1,294,000	1933	905,656,000	2,481,000	1945	1,713,655,000	4,694,900
1922	557,531,000	1,528,000	1934	908,065,000	2,488,000	1946	1,733,939,000	4,750,500
1923	732,407,000	2,007,000	1935	996,596,000	2,730,000	1947	1,856,987,000	5,087,600
1924	713,940,000	1,956,000	1936	1,099,687,000	3,013,000	1948	2,020,185,000	5,519,600
1925	763,743,000	2,092,000	1937	1,279,160,000	3,505,000	1949	1,841,940,000	5,046,400
1926	770,874,000	2,112,000	1938	1,214,355,000	3,327,000	1950	1,971,845,000	5,402,300
1927	901,129,000	2,469,000	1939	1,264,962,000	3,466,000	1951	2,244,404,000	6,149,100
1928	901,474,000	2,469,000	1940	1,353,214,000	3,707,000	1952 Est.	2,319,000,000	6,336,100
1929	1,007,323,000	2,760,000	1941	1,402,228,000	3,842,000			

Source: U. S. Bureau of Mines, except 1951, which has been calculated with aid of Bureau statistics for first 10 months and American Petroleum Institute weekly reports for last two months.

larged consuming rates. The decrease in imports was due to the loss of Iranian production at mid-year, which also caused exports to increase during the latter half of the year.

Although production started off the year with a record of 5,907,000 barrels per day in January, it grew almost without interruption to bigger peaks each month until it reached 6,375,000 barrels daily in October. Volumes tapered off slightly during the two closing months of the year.

Eighteen of the 27 producing states produced more oil in 1951 than in the preceding year. However, the bulk of the increase came from the four leading producing regions, with the principal contributor being Texas, the nation's biggest source of crude.

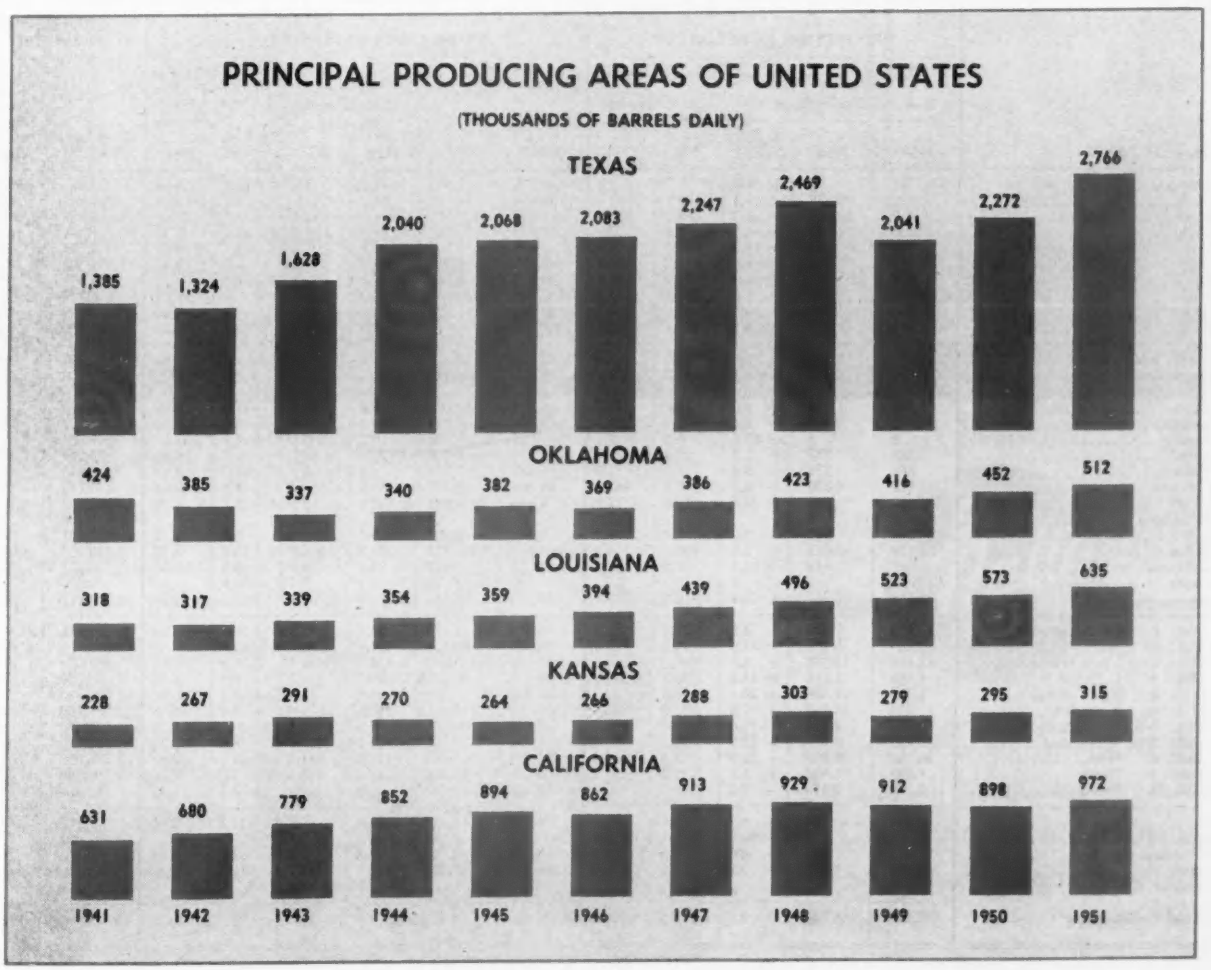


Texas Gains

Texas' production in 1951 averaged 2,766,400 barrels per day, a gain of 21 percent and 484,500 barrels per day over the 2,271,900 barrels produced in 1950. This producing rate constituted nearly 45 percent of all the oil produced in the U. S., whereas in the preceding year Texas had contributed only 42 percent of the nation's output. Texas has doubled its production in the last ten years, having produced only 1,385,100 barrels per day in 1941.

California reversed its downward trend of the previous two years by producing an all-time peak of 972,200 barrels per day as the Korean conflict made heavy demands for petroleum on the West Coast. This represented a gain of 74,600 barrels or 8.3 percent over 1950. Thus, California, although producing only one-third as much as Texas, maintained its hold on second position among oil-producing states by a comparatively safe margin. Despite this increase, the state produced only 15.8 percent of the U. S. total in contrast with 16.6 percent in the previous year.

Third place Louisiana also boosted its output with 635,100 barrels daily in contrast with 572,900 barrels the year before. This rate of production



was double the state's yield in 1941. Most of this state's recovery is from the Gulf Coast area, which produced 515,700 barrels per day in 1951.

Oklahoma, in fourth place with an average yield of 511,900 barrels daily, produced 13.3 percent more oil than the 451,800 barrels recovered in 1950.

The foregoing four states were the only ones to produce more than half a million barrels per day. Collectively, the big four producing states accounted for almost 80 percent of U. S. production last year.

Every district in Texas, with the exception of the Panhandle area, produced more crude last year than in the preceding 12 months. The biggest gain occurred in West Texas, where production averaged 941,500 barrels daily, a gain of 214,200 barrels or 29.4 percent over 1950. This area's output was equivalent to 15 percent of U. S. production. California was the only state to produce a larger volume than did the West Texas district.

While not approaching West Texas in quantity, a significant increase was recorded in adjoining West Central Texas. During the year output in the latter area was hiked 68.4 percent, from 62,700 barrels per day in 1950 to 105,600 barrels daily in 1951.

The Upper Gulf Coast area, second largest producing region in Texas, produced 494,200 barrels per day, a gain of 81,600 barrels or 19.8 percent.

Kansas' New High

Kansas, fifth largest producing state, boosted its output to a new all-time high of 314,800 barrels per day in comparison with 294,800 barrels in the preceding year.

Wyoming took over the sixth ranking spot from Illinois in recovering 185,700 barrels per day, an increase of 12.1 percent over the 165,600 barrels it produced in 1950.

Meanwhile, Illinois' output experienced a further drop, sliding to 161,900 barrels per day, down 4.6 percent from the 169,700 barrels it recovered in the previous year.

Steadily climbing production in New Mexico boosted output in this state to 144,400 barrels per day, in comparison with 131,500 barrels in 1950. A continued decrease in Illinois coupled with additional growth in New Mexico may soon put the latter ahead of the former state within a short time.

Besides Illinois, the following states produced less crude in 1951 than in 1950: Arkansas, Michigan, Mississippi, Ohio, Tennessee, Pennsylvania, West Virginia and Virginia

The Rocky Mountain region experienced a substantial increase in output. In addition to the gain recorded by Wyoming, production in Montana, Colorado and Utah was larger. This area listed the only new producing state during the year when North Dakota joined the ranks.

(See tables on 176 and 179.)

U. S. Crude Production, By States and Districts, December and Years, 1950 and 1951

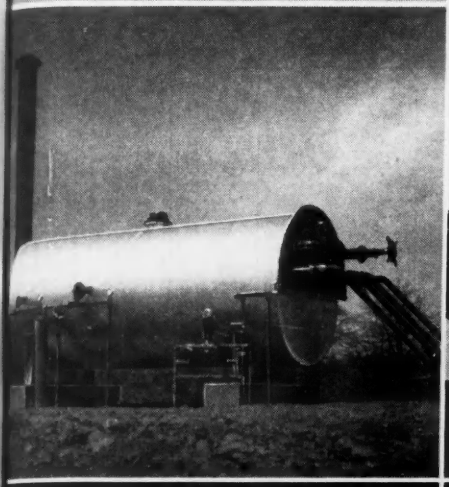
From U. S. Bureau of Mines, except November and December, 1950, estimated from A.P.I. weekly reports, and breakdown of Louisiana and Texas by districts based on various sources.

(THOUSANDS OF BARRELS)

STATE or DISTRICT	PRODUCTION IN DECEMBER: Monthly Total in December 1950	Monthly Total in December 1951	% Diff. '50-'51	Daily Average for December 1950	Daily Average for December 1951	PRODUCTION DURING YEAR: Year Total 1950	Year Total 1951	Daily Average for Year 1950	Daily Average for Year 1951	% Diff. '50-'51	Year's Prod. in 1951 as Percent of U.S. Total	CUMULATIVE PRODUCTION To End of 1951: Thousands Barrels	As Percent of U.S. Cumulative
Alabama	84	87	+ 3.6	2.7	2.8	735	1,030	2.0	2.8	—40.1	0.05	3,693	0.01
Arkansas	2,564	2,556	— 0.3	82.7	82.5	31,108	29,848	85.2	81.8	— 4.1	1.33	825,950	1.91
California	29,725	30,614	+ 3.0	958.9	987.5	327,627	354,840	897.6	972.2	+ 8.3	15.81	8,974,458	20.79
Colorado	2,326	2,415	+ 3.8	75.0	77.9	23,353	27,293	63.9	74.8	+16.9	1.22	174,353	0.40
Florida	46	53	+ 15.2	1.5	1.7	487	598	1.3	1.6	+22.8	0.03	2,178	0.01
Illinois	5,048	5,294	+ 4.9	162.9	170.8	61,922	59,098	169.7	161.9	— 4.6	2.63	1,565,308	3.63
Indiana	819	994	+ 21.4	26.4	32.1	9,942	10,685	27.2	29.3	+ 7.5	0.48	210,651	0.49
Kansas	9,350	9,776	+ 4.5	301.6	315.3	107,586	114,903	294.9	314.8	+ 6.8	5.12	2,214,426	5.13
Kentucky	903	1,080	+ 19.6	29.1	34.8	10,301	11,620	28.2	31.8	+12.8	0.52	263,786	0.61
*Louisiana	18,852	19,819	+ 5.1	608.1	639.3	209,116	231,817	572.9	635.1	+10.8	10.33	2,792,984	6.47
North Louisiana	3,717	3,905	+ 5.0	119.9	125.9	44,240	43,574	121.2	119.4	— 1.5	1.94	835,303	1.93
South Louisiana	15,135	15,914	+ 5.1	488.2	513.4	164,876	188,243	451.7	515.7	+14.2	8.39	1,630,606	3.78
Michigan	1,239	1,189	— 4.0	40.0	38.3	15,811	14,034	43.3	38.4	—11.2	0.62	336,266	0.78
Mississippi	3,231	3,152	— 2.4	104.2	101.7	38.258	37,141	104.8	101.8	— 2.9	1.65	321,222	0.74
Missouri	2	3	+ 50.0	0.1	0.1	28	30	0.1	0.1	+ 7.1	.....	604	.....
Montana	738	777	+ 5.3	23.8	25.1	8,112	8,998	22.2	24.7	+10.9	0.40	177,252	0.41
Nebraska	249	234	— 6.0	8.0	7.5	1,547	2,531	4.2	6.9	+63.6	0.11	9,915	0.02
New Mexico	4,213	4,570	+ 8.5	135.9	147.4	48,001	52,718	131.5	144.4	+ 9.8	2.35	735,747	1.71
New York	342	413	+ 20.8	11.0	13.3	4,143	4,381	11.4	12.0	+ 5.7	0.20	181,392	0.42
North Dakota	.....	5	.....	.....	0.2	.....	23	.....	0.1	.....	.....	23	.....
Ohio	249	229	— 8.0	8.0	7.4	3,333	3,122	9.1	8.6	+ 6.3	0.14	624,071	1.45
Oklahoma	15,462	16,072	+ 3.9	498.8	518.4	164,899	186,859	451.8	511.9	+13.3	8.32	6,448,623	14.94
Pennsylvania	957	843	— 11.9	30.9	27.2	11,812	11,167	32.4	30.6	— 5.5	0.50	1,136,283	2.63
Tennessee	1	1	.....	.....	.....	20	14	0.1	0.1	—30.0	.....	526	.....
*Texas	74,728	86,647	+ 15.9	2,410.6	2,795.1	829,231	1,009,755	2,271.9	2,766.4	+21.1	44.99	14,731,971	34.13
Dist. 1: South Central	963	1,019	+ 5.8	31.1	32.9	10,454	12,171	28.6	33.3	+16.4	0.54	299,645	0.69
Dist. 2: Middle Gulf	4,480	5,155	+ 15.6	144.5	166.3	48,860	60,156	133.9	164.8	+23.1	2.68	615,055	1.42
Dist. 3: Upper Gulf	13,848	15,063	+ 8.8	446.7	485.9	150,600	180,401	412.6	494.2	+19.8	8.04	2,800,628	6.49
Dist. 4: L. Gulf-S.W.	6,886	7,944	+ 15.4	222.1	256.3	76,629	93,711	209.9	256.7	+22.3	4.18	1,018,926	2.36
Dist. 5: East Central	1,256	1,638	+ 30.4	40.5	52.8	13,912	19,190	36.1	52.6	+45.5	0.86	529,640	1.23
Dist. 6: Northeast	11,384	12,248	+ 7.6	367.2	395.1	131,568	142,706	360.5	391.0	+ 8.5	6.36	2,589,106	6.00
Dist. 7-B: N. Central	2,254	2,614	+ 16.0	72.7	84.3	25,269	30,221	69.0	82.8	+19.6	1.35	516,304	1.20
Dist. 7-C: W. Central	2,489	3,816	+ 53.3	80.3	123.1	22,883	38,530	62.7	105.6	+68.4	1.72	292,679	0.18
Dist. 8: West	24,138	29,660	+ 22.9	778.6	956.8	265,474	343,646	727.3	941.5	+29.4	15.31	2,755,209	6.38
Dist. 9: North	4,628	4,900	+ 5.9	149.3	158.1	52,760	56,894	144.5	155.9	+ 7.8	2.53	1,161,085	2.69
Dist. 10: Panhandle	2,790	2,590	— 7.2	90.0	83.5	33,153	31,783	90.9	87.1	— 4.1	1.42	701,956	1.63
Utah	114	104	— 8.8	3.7	3.4	1,208	1,344	3.3	3.7	+11.2	0.06	3,200	0.01
Virginia	1	3	+200.0	0.1	0.1	20	16	0.1	0.1	—20.0	.....	206	.....
West Virginia	212	211	— 0.5	6.8	6.8	2,788	2,741	7.6	7.5	— 1.7	0.12	443,681	1.03
Wyoming	5,821	5,478	— 5.9	187.8	176.7	60,457	67,798	165.6	185.7	+12.1	3.02	982,422	2.28
Unclassified	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	572	.....
Total United States	177,276	192,619	+ 8.6	5,718.6	6,213.4	1,971,845	2,244,404	5,402.3	6,149.1	+13.8	100.0	43,161,763	100.00

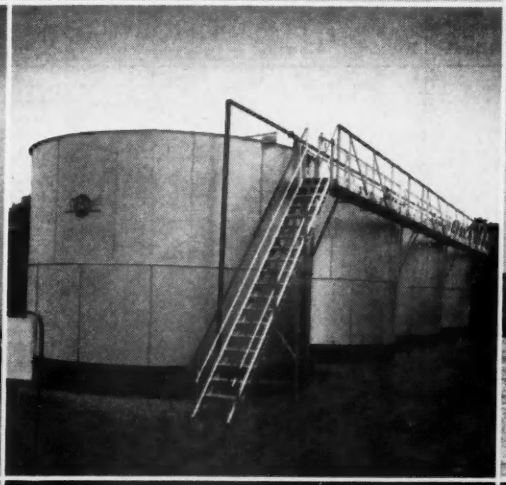
* Data on Louisiana and Texas by districts are from various sources and do not agree with state totals, which are on Bureau of Mines basis.

NATIONAL
INDIRECT HEATERS



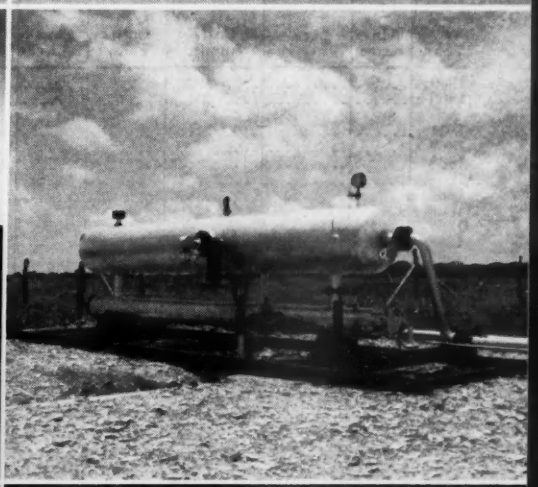
SEAMLESS STEEL TUBES OR
CAST IRON COILS

NATIONAL
API BOLTED TANKS



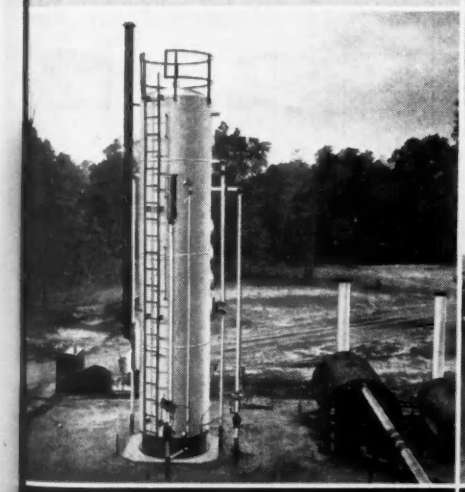
CAPACITIES
65 BARRELS TO 10,000 BARRELS

NATIONAL GAS, OIL
AND WATER SEPARATORS



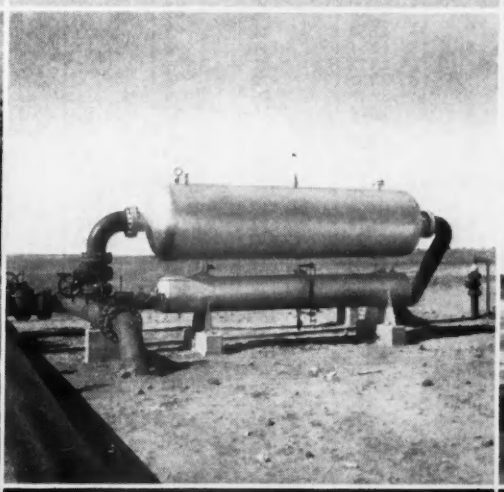
DOUBLE BARREL, SINGLE BARREL
ALL PRESSURES AND CAPACITIES

NATIONAL
EMULSION TREATERS



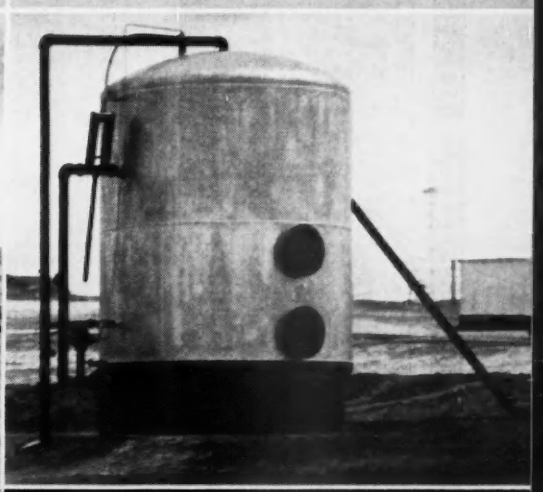
MORE TREATED OIL
AT LESS COST

NATIONAL
HORIZONTAL SEPARATORS



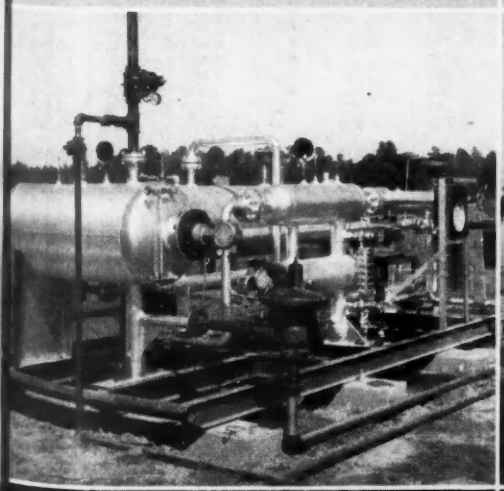
FOR GREATER ACTUAL
FIELD CAPACITIES

NATIONAL
FREEWATER KNOCKOUTS



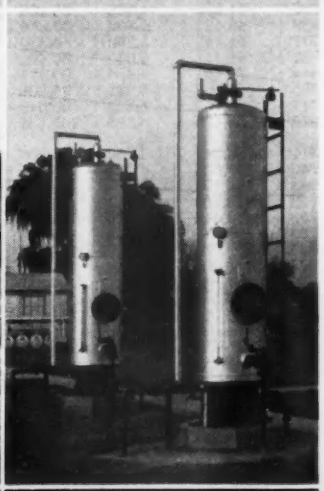
ALSO AVAILABLE IN HORIZONTAL
TYPES — ALL PRESSURES

NATIONAL LOW TEMPERATURE
EXTRACTION UNITS



LTX — INCREASED RECOVERIES

NATIONAL
VERTICAL SEPARATORS



ALL PRESSURES
AND CAPACITIES

It's a National

Wherever you go, in any of the principal oil producing areas of the United States and Canada, you will find National stocks, sales and service facilities.

NATIONAL TANK COMPANY
TULSA, OKLAHOMA

United States Crude Oil Production, By States, By Years (Part 1)

Data in thousands of barrels: from *Mineral Resources* and *Minerals Yearbook*, except where otherwise indicated in footnotes.

Year	Alabama	Arkansas	California	Colorado	Florida	Illinois	Indiana	Kansas	Kentucky	Louisiana	Michigan	Mississippi	Missouri	Montana	Nebraska	New Mexico
1859	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1860	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1861	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1862	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1863	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1864	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	....	.....	.....
1865	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	....	.....	.....
1866	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	...	.....	.....
1867	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1868	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1869	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1870	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1871	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1872	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1873	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1874	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1875	.....	.....	.....	.....	.....	.....	.....	.....	E	.....	.....	.....	.....	.....	.....	.....
1876	.....	.....	12	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1877	.....	.....	13	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1878	.....	.....	15	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1879	.....	.....	20	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1880	.....	.....	40	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1881	.....	.....	100	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1882	.....	.....	129	.....	.....	.....	.....	.....	G E	.....	.....	.....	.....	.....	.....	.....
1883	.....	.....	143	.....	.....	.....	.....	.....	G5	.....	.....	.....	.....	.....	.....	.....
1884	.....	.....	262	.....	.....	.....	.....	.....	G4	.....	.....	.....	.....	.....	.....	.....
1885	.....	.....	325	.....	.....	.....	.....	.....	G5	.....	.....	.....	.....	.....	.....	.....
1886	.....	.....	377	.....	.....	.....	.....	.....	G5	.....	.....	.....	.....	.....	.....	.....
1887	.....	.....	678	76	.....	.....	.....	.....	G5	.....	.....	.....	.....	.....	.....	.....
1888	.....	.....	690	298	.....	.....	.....	.....	G5	.....	.....	.....	.....	.....	.....	.....
1889	.....	.....	303	317	.....	1	33	1	G5	.....	.....	.....	H	.....	.....	.....
1890	.....	.....	307	369	.....	1	64	1	G6	.....	.....	.....	H	.....	.....	.....
1891	.....	.....	324	666	.....	1	137	1	G9	.....	.....	.....	H	.....	.....	.....
1892	.....	.....	385	824	.....	1	698	5	G7	.....	.....	.....	H	.....	.....	.....
1893	.....	.....	470	594	.....	1	2,335	18	G3	.....	.....	.....	H	.....	.....	.....
1894	.....	.....	706	516	.....	H	3,689	40	G2	.....	.....	.....	H	.....	.....	.....
1895	.....	.....	1,209	438	.....	H	4,386	44	G2	.....	.....	.....	H	.....	.....	.....
1896	.....	.....	1,253	361	.....	H	4,681	114	G2	.....	.....	.....	H	.....	.....	.....
1897	.....	.....	1,903	385	.....	1	4,122	81	G H	.....	.....	.....	H	.....	.....	.....
1898	.....	.....	2,257	444	.....	H	3,731	72	G6	.....	.....	.....	H	.....	.....	.....
1899	.....	.....	2,642	390	.....	H	3,848	70	G18	.....	.....	.....	H	.....	.....	.....
1900	.....	.....	4,325	317	.....	H	4,874	75	G62	.....	J	.....	J2	.....	.....	.....
1901	.....	.....	8,787	461	.....	H	5,757	179	G137	.....	J	.....	J2	.....	.....	.....
1902	.....	.....	13,984	397	.....	H	7,481	332	G185	549	J	.....	J1	.....	.....	.....
1903	.....	.....	24,382	484	.....	.....	9,186	932	G554	918	J	.....	J3	.....	.....	.....
1904	.....	.....	29,649	501	.....	.....	11,339	4,251	G998	2,959	J	.....	J3	.....	.....	.....
1905	.....	.....	33,428	376	.....	181	10,964	I3,750	G1,217	8,910	J	.....	J3	.....	.....	.....
1906	.....	.....	33,099	328	.....	4,397	7,674	I3,627	G1,214	9,077	J	.....	J3	.....	.....	.....
1907	.....	.....	39,748	332	.....	24,282	5,128	2,410	G821	5,000	J	.....	J4	.....	.....	.....
1908	.....	.....	44,855	380	.....	33,686	3,283	1,801	728	5,789	J	.....	J15	.....	.....	.....
1909	.....	.....	55,472	311	.....	30,898	2,296	1,264	639	3,060	J	.....	J6	.....	.....	.....
1910	.....	.....	73,011	240	.....	33,143	2,160	1,128	469	6,841	J	.....	J4	.....	.....	.....
1911	.....	.....	81,134	227	.....	31,317	1,695	1,279	472	10,721	J	.....	J8	.....	.....	.....
1912	.....	.....	87,269	206	.....	28,602	970	1,593	484	9,263	K	.....	.....	.....	.....	.....
1913	.....	.....	97,788	189	.....	23,894	956	2,375	525	12,499	K	.....	K	.....	.....	K
1914	.....	.....	99,775	223	.....	21,920	1,336	3,104	503	14,309	K	.....	K	.....	.....	.....
1915	.....	.....	86,592	208	.....	19,042	876	2,823	437	18,192	K	.....	K	.....	.....	.....
1916	.....	.....	90,952	197	.....	17,714	769	8,738	L1,202	15,248	K	.....	K	45	.....	.....
1917	.....	.....	93,878	121	.....	15,777	760	36,536	L3,088	11,392	K	.....	.....	100	.....	.....
1918	.....	.....	97,532	143	.....	13,366	878	45,451	L4,368	16,043	K	.....	.....	69	.....	.....
1919	.....	.....	101,183	121	.....	11,960	972	33,048	9,278	17,188	K	.....	K	90	.....	K
1920	.....	K	103,377	111	.....	10,774	945	39,005	8,738	35,714	.....	.....	K	340	.....	K
1921	.....	10,473	112,600	108	.....	10,043	1,158	36,456	9,013	27,103	.....	.....	K	1,509	.....	K
1922	.....	12,712	138,468	97	.....	9,383	1,087	31,766	8,973	35,376	.....	.....	K	2,449	.....	K
1923	.....	36,610	262,876	86	.....	8,707	1,043	28,250	8,069	24,919	.....	.....	K	2,782	.....	K
1924	.....	46,028	228,933	445	.....	8,081	935	28,836	7,407	21,124	.....	.....	.....	2,815	.....	98
1925	.....	77,398	232,492	1,226	.....	7,863	829	38,357	6,759	20,272	4	.....	.....	4,091	.....	1,060
1926	.....	58,332	224,673	2,768	.....	7,760	808	41,498	6,274	23,201	94	.....	.....	7,727	.....	1,666
1927	.....	40,005	231,196	2,831	.....	6,994	852	41,069	6,719	22,818	439	.....	.....	5,058	.....	1,226
1928	.....	32,096	231,811	2,774	.....	6,462	1,052	38,596	7,359	21,847	594	.....	.....	4,015	.....	943
1929	.....	24,917	292,534	2,358	.....	6,319	981	42,813	7,775	20,554	4,528	.....	.....	3,980	.....	1,830
1930	.....	19,702	227,329	1,656	.....	5,736	994	41,638	7,389	23,272	3,911	.....	.....	3,349	.....	10,189
1931	.....	14,791	188,830	1,545	.....	5,039	840	37,018	6,456	21,804	3,789	.....	.....	2,830	.....	15,227
1932	.....	12,051	178,128	1,136	.....	4,673	806	34,848	6,287	21,807	6,910	.....	K	2,457	.....	12,455
1933	.....	11,686	172,010	919	.....	4,244	737	41,976	4,608	25,168	7,942	K	K	2,273	.....	14,116
1934	.....	11,182	174,305	1,139	.....	4,479	838	46,482	4,860	32,869	10,603	K	K	3,603	.....	16,864
1935	.....	11,008	207,832	1,560	.....	4,322	777	54,843	5,258	50,330	15,776	K	K	4,603	.....	20,483
1936	.....	10,469	214,773	1,650	.....	4,475	822	58,317	5,633	80,491	11,928	.....	K	5,868	.....	27,223
1937	.....	11,764	238,521	1,605	.....	7,499	844	70,761	5,484	90,924	16,628	.....	K	5,805	.....	38,854
1938	.....	18,180	249,749	1,412	.....	24,075	995	60,064	5,821	95,208	18,745	.....	K	4,946	.....	35,759
1939	.....	21,238	224,354	1,404	.....	94,912	1,711	60,703	5,621	93,646	23,462	107	40	5,960	2	37,637
1940	.....	25,775	223,881	1,626	.....	147,647	4,978	66,139	5,188	103,584	19,753	4,400	44	6,728	276	39,129
1941	.....	26,327	230,263	2,150	.....	132,393	7,411	83,242	4,762	115,908	16,359	15,327	47	7,526	1,898	39,560
1942	.....	26,628	248,326	2,199	.....	106,391	6,743	97,636	4,534	115,785	21,754	28,833	36	8,074	1,237	31,544
1943	.....	27,600	284,188	2,320	4	82,260	5,283	106,178	7,883	123,592	20,768	18,807	36	7,916	635	38,896
1944	43	29,418	311,793	3,083	12	77,413	5,118	98,762	9,621	129,645	18,490	16,337	45	8,647	417	39,555
1945	181	28,613	326,482	5,036	30	75,094	4,868	96,415	10,325	131,051	17,267	19,062	45	8,420	305	37,351
1946	380	28,375	314,713	11,856	57	75,297	6,726	97,218	10,578	143,669	17,074	24,298	51	8,825	293	36,814
1947	396	29,948	333,132	15,702	259	66,459	6,095	105,132	9,397	160,128	16,215	34,925	55	8,742	229	40,926
1948	466	31,682	340,074	17,878	290	64,808	6,974	110,908	8,801	181,458	16,871	45,761	44	9,382	215	47,969
1949	462	29,986	332,942	23,587	441	64,501	9,696	101,868	8,803	190,826	16,517	37,996	49	9,118	330	47,645
1950	735	31,108	327,627	23,353	487	61,922	9,942	107,586	10,301	209,116	15,811	38,258	28	8,112	1,547	48,001
1951P	1,030	29,848	354,840	27,293	598	59,098	10,685	114,903	11,620	231,817	14,034	37,141	30	8,998	2,531	52,718
Total	3,693	825,950	8,974,458	174,353	2,178	1,565,308	210,651	2,214,426	263,786	2,792,984	336,266	321,222	604	177,252	9,915	735,747

A Utah production estimated at 3,650 barrels in 1939; 3,126 barrels in 1940; and 189,726 barrels cumulative through 1940.

B *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer, shows for Alaska the following data: 1904-1919, estimated, 56,000 barrels; 1920, 11,000 barrels; 1921, 10,000 barrels; 1922-1928, estimated, 73,000 barrels; total, 1904-1928, 150,000 barrels.

C "Unclassified" includes 1912, Alaska and Michigan; 1913, Alaska, Michigan, Missouri and New Mexico; 1914-16, Alaska, Michigan and Missouri; 1917-18, Alaska and Michigan; 1919, Alaska, Michigan, Missouri and New Mexico; 1920. Alaska, Arkansas, Missouri, New Mexico and Utah; 1921-23, Alaska, Missouri and New Mexico; 1924-31, Alaska and Utah; 1932, Alaska, Missouri and Utah; 1933, Alaska, Mississippi, Missouri and Utah; 1934, Mississippi, Missouri and Utah; 1935, Mississippi, Missouri, Tennessee and Utah; 1936-1938; Missouri, Tennessee and Utah.

D Pennsylvania and New York separated in years 1864-1881, by aid of *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer.

E *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer, gives the following additional estimates which are not shown by the official *Mineral Resources*; Ohio, 1860-1875, 200,000 barrels; West Virginia, 1860-1875, 2,800,000 barrels; Kentucky, 1860-1882, 161,000 barrels.

United States Crude Oil Production, By States, By Years (Part 2)

Data in thousands of barrels; from *Mineral Resources and Minerals Yearbook*, except where otherwise indicated in footnotes.

Year	New York	N. Dakota	Ohio	Oklahoma	Pennsylvania	Tennessee	Texas	[A] Utah	Virginia	West Virginia	Wyoming	[B] Alaska	[C] Unclassified	Total United States	Total Value At Wells (Thousands of Dollars)	[O] Average Value per Bbl.
1859	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	2	$ 32	$20.00
1860	.....	.....	[E]	.....	500	.....	.....	.....	.....	[E]	.....	.....	.....	500	4,800	9.60
1861	.....	.....	[E]	.....	2114	.....	.....	.....	.....	[E]	.....	.....	.....	2,114	1,036	.52
1862	.....	.....	[E]	.....	3,057	.....	.....	.....	.....	[E]	.....	.....	.....	3,057	3,210	1.05
1863	.....	.....	[E]	.....	2,611	.....	.....	.....	.....	[E]	.....	.....	.....	2,611	8,226	3.15
1864	[D F H]	.....	[E]	.....	[D F]2,116	.....	.....	.....	.....	[E]	.....	.....	.....	2,116	20,897	8.15
1865	[D]100	.....	[E]	.....	[D]2,398	.....	.....	.....	.....	[E]	.....	.....	.....	2,498	16,460	6.59
1866	[D]144	.....	[E]	.....	[D]3,454	.....	.....	.....	.....	[E]	.....	.....	.....	3,598	13,455	3.75
1867	[D]134	.....	[E]	.....	[D]3,213	.....	.....	.....	.....	[E]	.....	.....	.....	3,347	8,067	2.40
1868	[D]146	.....	[E]	.....	[D]3,500	.....	.....	.....	.....	[E]	.....	.....	.....	3,646	13,217	3.62
1869	[D]169	.....	[E]	.....	[D]4,046	.....	.....	.....	.....	[E]	.....	.....	.....	4,215	23,730	5.60
1870	[D]211	.....	[E]	.....	[D]5,050	.....	.....	.....	.....	[E]	.....	.....	.....	5,261	20,504	3.90
1871	[D]208	.....	[E]	.....	[D]4,997	.....	.....	.....	.....	[E]	.....	.....	.....	5,205	22,591	4.40
1872	[D]252	.....	[E]	.....	[D]6,041	.....	.....	.....	.....	[E]	.....	.....	.....	6,293	21,440	3.75
1873	[D]396	.....	[E]	.....	[D]9,498	.....	.....	.....	.....	[E]	.....	.....	.....	9,894	18,100	1.80
1874	[D]437	.....	[E]	.....	[D]10,490	.....	.....	.....	.....	[E]	.....	.....	.....	10,927	12,648	1.15
1875	[D]352	.....	[E]	.....	[D]8,436	.....	.....	.....	.....	[E]	.....	.....	.....	8,788	7,368	.97
1876	[D]359	.....	32	.....	[D]8,610	[G]	.....	.....	.....	120	.....	.....	.....	9,133	22,983	2.52
1877	[D]525	.....	30	.....	[D]12,610	[G]	.....	.....	.....	172	.....	.....	.....	13,350	31,789	2.38
1878	[D]607	.....	38	.....	[D]14,557	[G]	.....	.....	.....	180	.....	.....	.....	15,397	18,045	1.17
1879	[D]787	.....	29	.....	[D]18,898	[G]	.....	.....	.....	180	.....	.....	.....	19,914	17,211	.86
1880	[D]1,041	.....	39	.....	[D]24,987	[G]	.....	.....	.....	179	.....	.....	.....	26,286	24,601	.94
1881	[D]1,095	.....	34	.....	[D]26,281	[G]	.....	.....	.....	151	.....	.....	.....	27,661	25,448	.92
1882	6,685	.....	40	.....	23,368	[G]	.....	.....	.....	128	.....	.....	.....	30,350	23,631	.78
1883	4,004	.....	47	.....	19,125	[G]	.....	.....	.....	126	.....	.....	.....	23,450	25,790	1.10
1884	3,231	.....	90	.....	20,541	[G]	.....	.....	.....	90	.....	.....	.....	24,218	20,596	.85
1885	2,658	.....	662	.....	18,118	[G]	.....	.....	.....	91	.....	.....	.....	21,859	19,198	.88
1886	2,151	.....	1,783	.....	23,647	[G]	.....	.....	.....	102	.....	.....	.....	28,065	19,996	.71
1887	2,075	.....	5,023	.....	20,281	[G]	.....	.....	.....	145	.....	.....	.....	28,283	18,877	.67
1888	1,789	.....	10,011	.....	14,700	[G]	.....	.....	.....	119	.....	.....	.....	27,612	17,948	.65
1889	1,897	.....	12,472	.....	19,591	[G]	[H]	.....	.....	544	.....	.....	.....	35,164	26,963	.77
1890	1,658	.....	16,125	.....	26,800	[G]	.....	.....	.....	493	.....	.....	.....	45,824	35,365	.77
1891	1,585	.....	17,740	[H]	31,424	[G]	[H]	.....	.....	2,406	.....	.....	.....	54,293	30,527	.56
1892	1,273	.....	16,363	[H]	27,149	[G]	[H]	.....	.....	3,810	.....	.....	.....	50,515	25,907	.51
1893	1,032	.....	16,249	[H]	19,283	[G]	[H]	.....	.....	8,446	.....	.....	.....	48,431	28,950	.60
1894	942	.....	16,792	[H]	18,078	[G]	[H]	.....	.....	8,577	2	.....	.....	49,344	35,522	.72
1895	913	.....	19,545	[H]	18,231	[G]	[H]	.....	.....	8,120	4	.....	.....	52,892	57,632	1.09
1896	1,205	.....	23,941	[H]	19,379	[G]	1	.....	.....	10,020	3	.....	.....	60,960	58,519	.96
1897	1,279	.....	21,561	1	17,983	[G]	66	.....	.....	13,090	4	.....	.....	60,476	40,874	.68
1898	1,205	.....	18,739	.....	14,743	[G]	546	.....	.....	13,615	6	.....	.....	55,364	44,193	.80
1899	1,321	.....	21,142	.....	13,054	[G]	669	.....	.....	13,911	6	.....	.....	57,071	64,604	1.13
1900	1,301	.....	22,363	6	13,258	[G]	836	.....	.....	16,196	6	.....	.....	63,621	75,989	1.19
1901	1,207	.....	21,648	10	12,625	[G]	4,394	.....	.....	14,177	5	.....	.....	69,389	66,417	.96
1902	1,120	.....	21,014	37	12,064	[G]	18,084	.....	.....	13,513	6	.....	.....	88,767	71,179	.80
1903	1,163	.....	20,480	139	11,355	[G]	17,956	.....	.....	12,900	9	.....	.....	100,461	94,694	.94
1904	1,113	.....	18,877	1,367	11,126	[G]	22,241	.....	.....	12,645	12	[N]	.....	117,081	101,175	.86
1905	1,118	.....	16,347	[I]8,264	10,437	[G]	28,136	.....	.....	11,578	8	.....	.....	134,717	84,157	.62
1906	1,243	.....	14,788	[I]18,091	10,257	[G]	12,568	.....	.....	10,121	7	.....	.....	126,494	92,445	.73
1907	1,212	.....	12,207	43,524	10,000	[G]	12,323	[M]	.....	9,095	[M]9	[N]	.....	166,095	120,107	.72
1908	1,160	.....	10,859	45,799	9,424	.....	11,207	[M]	.....	9,523	[M]18	.....	.....	178,527	129,079	.72
1909	1,135	.....	10,633	47,859	9,299	.....	9,534	[M]	.....	10,745	[M]20	.....	.....	183,171	128,329	.70
1910	1,054	.....	9,916	52,029	8,795	.....	8,899	[M]	.....	11,753	[M]115	.....	.....	209,557	127,900	.61
1911	953	.....	8,817	56,069	8,248	.....	9,526	[M]	.....	9,796	[M]187	[N]	.....	220,449	134,045	.61
1912	874	.....	8,969	51,427	7,838	.....	11,735	[M]	.....	12,129	[M]1,572	[K]	4	222,935	164,213	.74
1913	948	.....	8,781	63,579	7,917	.....	15,010	[N]	.....	11,567	2,407	[K]	11	248,446	237,121	.95
1914	939	.....	8,536	73,632	8,170	.....	20,068	[N]	.....	9,680	3,560	[K]	8	265,763	214,125	.81
1915	888	.....	7,825	97,915	7,838	.....	24,943	[N]	.....	9,265	4,246	[K]	14	281,104	179,463	.64
1916	874	.....	7,744	107,072	7,593	[L]1	27,645	[N]	.....	8,731	6,234	[K]	8	300,767	330,900	1.10
1917	880	.....	7,751	107,508	7,733	[L]12	32,413	[N]	.....	8,379	8,978	[K]	10	335,316	522,635	1.56
1918	809	.....	7,285	103,347	7,408	[L]8	38,750	[N]	.....	7,867	12,596	[K]	8	355,928	703,944	1.98
1919	851	.....	7,736	86,911	8,137	15	79,366	[N]	.....	8,327	13,172	[K]	12	378,367	760,266	2.01
1920	906	.....	7,400	106,206	7,438	14	96,868	[K]	.....	8,249	16,831	[K]	13	442,929	1,360,745	3.07
1921	988	.....	7,335	114,634	7,418	12	106,166	.....	.....	7,822	19,333	[K]	12	472,183	814,745	1.73
1922	1,000	.....	6,781	149,571	7,425	10	118,684	.....	.....	7,021	26,715	[K]	13	557,531	895,111	1.61
1923	1,250	.....	7,085	160,929	7,609	8	131,023	.....	.....	6,358	44,785	[K]	18	732,407	978,430	1.34
1924	1,440	.....	6,811	173,538	7,486	10	134,522	[K]	.....	5,920	39,498	[K]	13	713,940	1,022,683	1.43
1925	1,695	.....	7,212	176,768	8,097	24	144,648	[K]	.....	5,763	29,173	[K]	12	763,743	1,284,960	1.68
1926	1,956	.....	7,272	179,195	8,961	43	166,916	[K]	.....	5,946	25,776	[K]	8	770,874	1,447,760	1.88
1927	2,242	.....	7,593	277,775	9,526	60	217,389	[K]	.....	6,023	21,307	[K]	7	901,129	1,172,830	1.30
1928	2,603	.....	7,015	249,857	9,956	46	257,320	[K]	.....	5,661	21,461	[K]	6	901,474	1,054,880	1.17
1929	3,377	.....	6,743	255,004	11,820	19	296,876	[K]	.....	5,574	19,314	[K]	7	1,007,323	1,280,417	1.27
1930	3,647	.....	6,486	216,486	12,803	21	290,457	[K]	.....	5,071	17,868	[K]	7	898,011	1,070,200	1.19
1931	3,363	.....	5,327	180,574	11,892	6	332,437	[K]	.....	4,472	14,834	[K]	7	851,081	550,630	.65
1932	3,508	.....	4,644	153,244	12,412	5	312,478	[K]	.....	3,876	13,418	[K]	16	785,159	680,460	.87
1933	3,181	.....	4,235	182,251	12,624	5	402,609	[K]	.....	3,815	11,227	[K]	30	905,656	608,000	.67
1934	3,804	.....	4,234	180,107	14,478	10	381,516	[K]	.....	4,095	12,556	.....	41	908,065	904,925	1.00
1935	4,236	.....	4,082	185,288	15,810	[K]	392,666	[K]	.....	3,902	13,755	.....	65	996,596	964,140	.96
1936	4,663	.....	3,847	206,555	17,070	[K]	427,411	[K]	.....	3,847	14,582	.....	63	1,099,687	1,199,820	1.09
1937	5,478	.....	3,559	228,839	19,189	[K]	510,318	[K]	.....	3,845	19,166	.....	77	1,279,160	1,513,340	1.18
1938	5,045	.....	3,298	174,994	17,426	[K]	475,850	[K]	.....	3,684	19,022	.....	82	1,214,355	1,373,060	1.13
1939	5,098	.....	3,156	159,913	17,382	50	483,528	4	.....	3,580	21,454	.....	.....	1,264,962	1,294,470	1.02
1940	4,999	.....	3,159	156,164	17,353	24	493,209	3	.....	3,444	25,711	.....	.....	1,353,214	1,385,440	1.02
1941	5,185	.....	3,510	154,702	16,750	12	505,572	4	.....	3,433	29,878	.....	.....	1,402,228	1,602,000	1.14
1942	5,421	.....	3,543	140,690	17,779	9	483,097	.....	.....	3,574	32,812	.....	.....	1,386,645	1,643,470	1.19
1943	5,059	.....	3,322	123,152	15,757	10	594,343	.....	2	3,349	34,253	.....	.....	1,505,613	1,809,020	1.20
1944	4,697	.....	2,937	124,616	14,118	8	746,699	.....	4	3,070	33,356	.....	.....	1,677,904	2,032,960	1.21
1945	4,648	.....	2,828	139,299	12,515	8	754,710	.....	4	2,879	36,219	.....	.....	1,713,655	2,094,250	1.22
1946	4,863	.....	2,908	134,794	12,996	10	760,215	.....	23	2,929	38,977	.....	.....	1,733,939	2,442,550	1.41
1947	4,762	.....	3,108	141,019	12,690	8	820,210	.....	61	2,617	44,772	.....	.....	1,856,987	3,577,890	1.93
1948	4,621	.....	3,600	154,455	12,667	6	903,498	.....	33	2,692	55,032	.....	.....	2,020,185	5,245,080	2.60
1949	4,425	.....	3,483	151,660	11,374	18	744,834	637	43	2,839	47,890	.....	.....	1,841,940	4,674,770	2.54
1950	4,143	.....	3,333	164,899	11,812	20	829,231	1,208	20	2,788	60,457	.....	.....	1,971,845	5,028,205	2.55
1951[P]	4,381	23	3,122	186,859	11,167	14	1,009,755	1,344	16	2,741	67,798	.....	.....	2,244,404	5,745,674	2.56
Total	181,392	23	624,071	6,448,623	1,136,283	526	14,731,971	3,200	206	443,681	982,422	.....	572	43,161,763	64,039,248	1.48

[F] New York included with Pennsylvania.

[G] Tennessee included with Kentucky, 1876-1907, inclusive.

[H] Less than 500 barrels.

[I] Figures for Oklahoma and Kansas for years 1905-1906 shown together by *Mineral Resources*; here divided by aid of *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer.

[J] Michigan shown with Missouri in 1900-1911.

[K] Included under "Unclassified."

[L] Kentucky and Tennessee figures in years 1916-18 obtained with aid of *Mineral Resources* and *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer.

[M] Insignificant production of Utah (mostly used as fuel) shown with Wyoming.

[N] Little production but no record available.

[O] Figures on average price per barrel for years 1859-1875 taken from *Petroleum in the United States and Possessions*, by Arnold and Kemnitzer; remainder from *Mineral Resources* and *Minerals Yearbook* except 1949 and 1950 estimated.

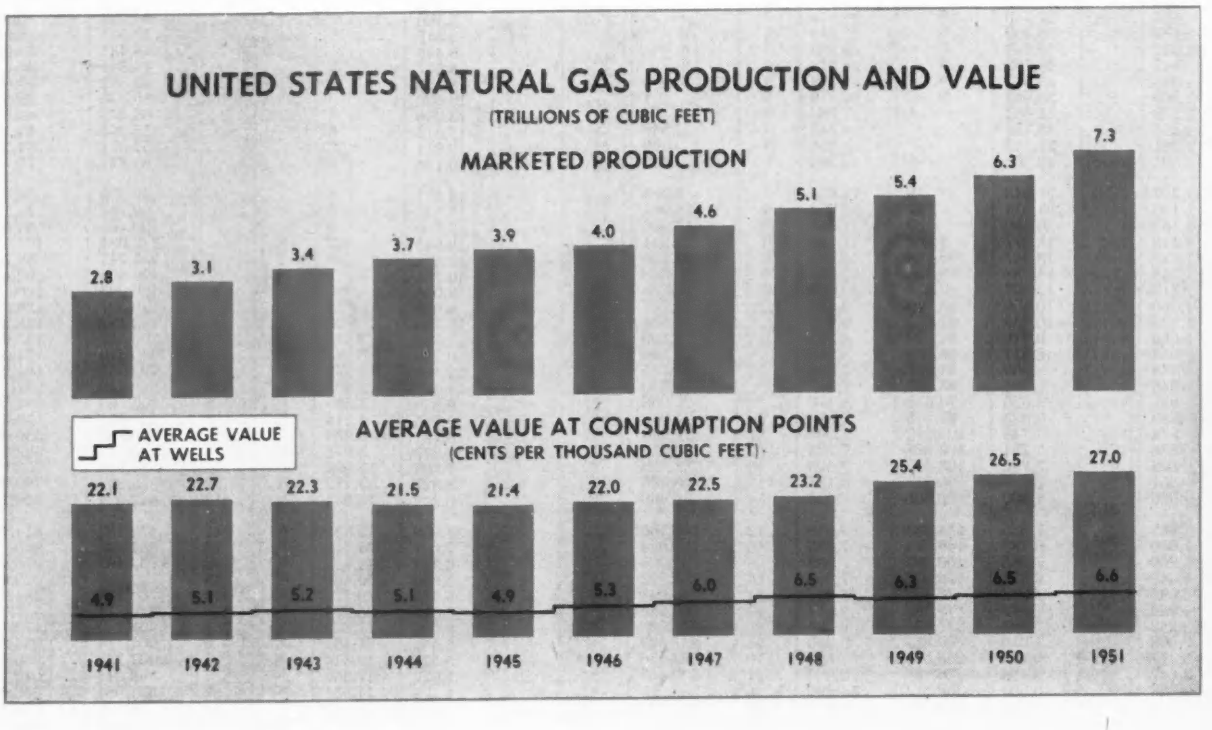
[P] Bureau of Mines figures for first 10 months; November and December estimated by World Oil, with aid of weekly reports of American Petroleum Institute and other sources.

Natural Gas

Expansion to Continue

GROWTH and new records have characterized the natural gas industry since World War II. Outlook for the industry for the coming year is as bright as it was a year ago when activity was at an all-time high. Records in every department were established during 1951. The industry produced more gas, sold more, took in more money, had more customers than in any previous year.

Net gas production increased nearly 14 percent to a total of 7850 billion cubic feet for the year. This is a net figure, for some gas produced was injected back into the ground for pressure-maintenance purposes. Revenues



YEAR	*No. of Producing Wells	Marketed Production (Millions of Cubic Feet)	Average Value (Cents per Thousand Cubic Feet) At Wells	Average Value (Cents per Thousand Cubic Feet) At Points of Consumption
1918...	†40,369	721,001	‡	21.3
1919...	†41,500	745,916	‡	21.6
1920...	†42,700	798,210	‡	24.6
1921...	†43,900	662,052	‡	26.4
1922...	†45,100	762,546	11.1	29.1
1923...	†46,300	1,006,976	10.0	23.8
1924...	†47,500	1,141,521	9.3	22.2
1925...	†48,700	1,188,571	9.4	22.3
1926...	†49,900	1,313,019	9.5	22.9
1927...	†51,100	1,445,428	8.8	22.0
1928...	†52,300	1,568,139	8.9	23.2
1929...	53,545	1,917,693	8.2	21.6
1930...	55,020	1,943,421	7.6	21.4
1931...	55,756	1,686,436	7.0	23.3
1932...	54,160	1,555,990	6.4	24.7
1933...	53,660	1,555,474	6.2	23.7
1934...	54,130	1,770,721	6.0	22.3
1935...	53,700	1,916,595	5.8	22.4
1936...	53,960	2,167,802	5.5	22.0
1937...	55,050	3,407,620	5.1	21.9
1938...	53,770	2,295,562	4.9	21.8
1939...	53,530	2,476,756	4.9	21.6
1940...	53,880	2,660,222	4.5	21.7
1941...	55,500	2,812,658	4.9	22.1
1942...	56,150	3,053,475	5.1	22.7
1943...	57,200	3,414,689	5.2	22.3
1944...	58,780	3,711,039	5.1	21.5
1945...	60,660	3,918,686	4.9	21.4
1946...	62,740	4,030,605	5.3	22.0
§1947...	63,670	4,582,173	6.0	22.5
1948...	64,212	5,148,020	6.5	23.2
1949...	64,146	5,419,736	6.3	25.4
1950...	‡	6,282,060	6.5	26.5
†1951...	‡	7,251,750	6.6	27.0

Source: U. S. Bureau of Mines. * Only dry natural gas producing wells included. † Estimated. ‡ Not available. § Beginning of new basis; includes gas stored and lost in transmission.

Summary of Annual Estimates of U. S. Reserves of Natural Gas and Natural Gas Liquids

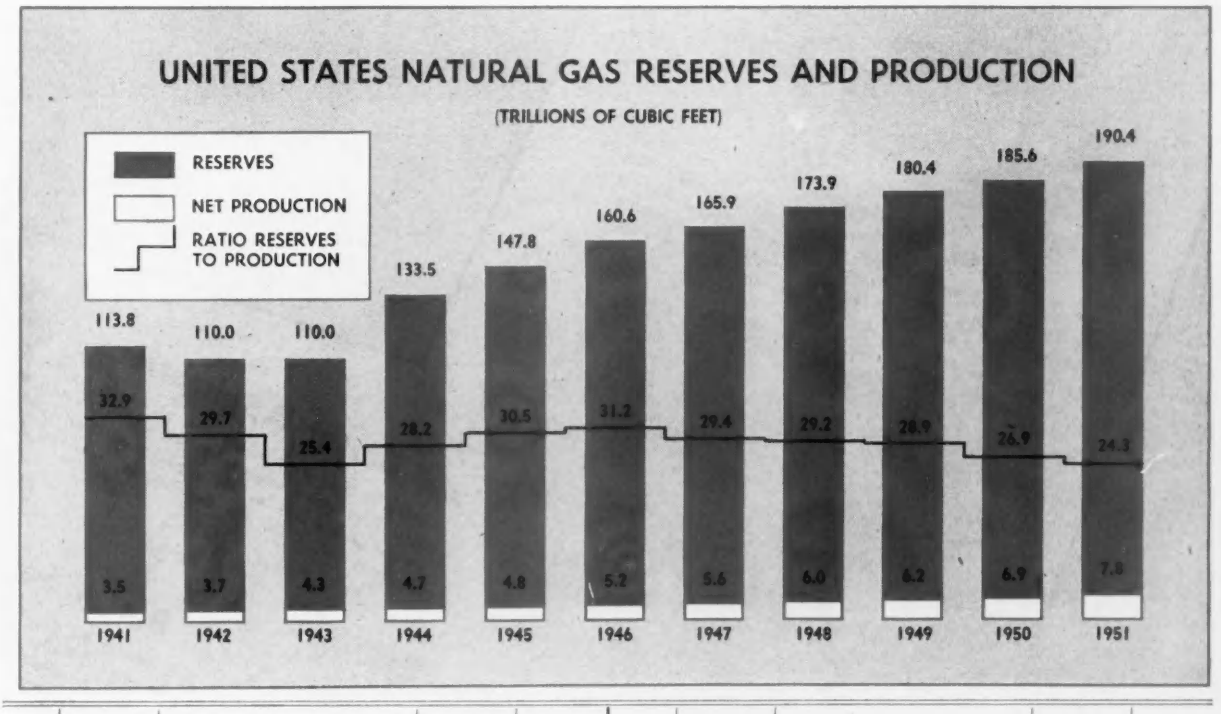
(Source: American Gas Association and American Petroleum Institute.)

Natural gas data in millions of cubic feet—14.65 psia, at 60° F.)

(Natural gas liquids in thousands of barrels of 42 U. S. gallons.)

YEAR	Estimated Proved Reserves Beginning of Year	CHANGES IN RESERVES DURING YEAR: (Add.) Reserves Proved: Extensions and Revisions	Discoveries of New Fields and New Pools in Old Fields	Total Reserves Proved During Year (Cols. 2+3)	(Add or Deduct) Net Change in Storage	(Deduct) Net Production During Year	(Net Change) Increase or Decrease (Cols. 4+5—6)	Estimated Proved Reserves End of Year (Cols. 1+7)	Ratio of Year-End Reserves to Year's Prod. (Year's Supply) Col. 8÷Col. 6
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Natural Gas:									
1945	.....	.....	.....	.....	.....	.....	.....	147,789,367	....
1946	147,789,367	.....	.....	17,729,152	*	4,942,617	+12,786,535	160,575,901	32.5
1947	160,575,901	7,570,654	3,410,170	10,980,824	*	5,629,811	+5,351,013	165,926,914	29.5
1948	165,926,914	9,769,483	4,129,089	13,898,572	+51,482	6,007,628	+7,942,426	173,869,340	28.9
1949	173,869,340	8,061,429	4,612,870	12,674,299	+82,746	6,245,041	+6,512,004	180,381,344	28.9
1950	180,381,344	9,172,381	2,877,351	12,049,732	+54,301	6,892,678	+5,211,355	185,592,699	26.9
†1951	185,592,699	.....	.....	12,650,000	+50,000	7,850,000	+4,850,000	190,442,699	24.3
Natural Gas Liquids:									
1946	.....	.....	.....	.....	.....	129,262	.....	3,163,219	24.5
1947	3,163,219	192,237	59,301	251,538	.....	160,782	+ 90,756	3,253,975	20.2
1948	3,253,975	405,874	64,683	470,557	.....	183,749	+286,808	3,540,783	19.3
1949	3,540,783	294,211	92,565	386,776	.....	198,547	+188,229	3,729,012	18.8
1950	3,729,012	707,879	58,183	766,062	.....	227,411	+538,651	4,267,663	18.8
†1951	4,267,663	.....	.....	565,350	.....	‡255,376	+309,974	4,577,637	17.9

* Not Estimated. † Estimated by WORLD OIL. ‡ Includes 205,501 plant production of natural gasoline, etc.; 30,375 lease condensate; estimated 19,500 losses and waste.



YEAR	Reserves at End of Year (Billions of Cubic Feet)	Authority for Estimate of Reserves	Marketed Production (Billions of Cubic Feet)	Years' Supply in Reserve
1918...	15,000	E. Holley Poe et al. in report	721	20.8
1919...	15,000	September 23, 1947	746	20.1
1920...	15,000	" " "	798	18.8
1921...	15,000	" " "	662	22.7
1922...	15,000	" " "	763	19.7
1923...	15,000	" " "	1,007	14.9
1924...	15,000	" " "	1,142	13.1
1925...	23,000	*Gas Facts, 1945 and 1946*	1,189	19.3
1926...	23,000	" "	1,313	17.5
1927...	23,000	" "	1,445	15.9
1928...	23,000	" "	1,568	14.7
1929...	23,000	" "	1,918	12.0
1930...	46,000	Earl P. Hines, then Cities Service	1,943	23.7
1931...	46,000	Co.	1,686	27.3
1932...	46,000	" " "	1,556	29.6
1933...	46,000	" " "	1,555	29.6
1934...	62,000	Ralph E. Davis, Consulting Engineer	1,771	35.0

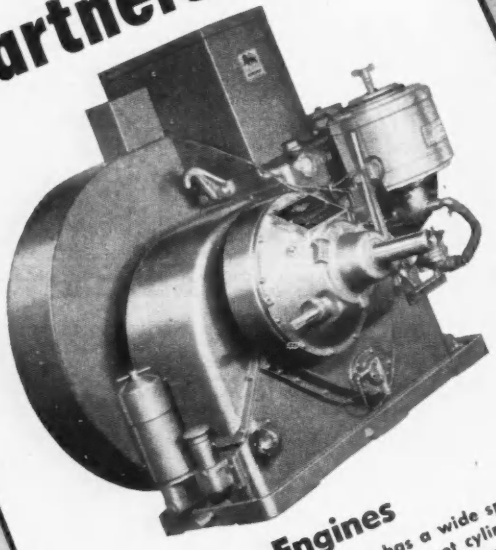
YEAR	Reserves at End of Year (Billions of Cubic Feet)	Authority for Estimate of Reserves	Net Production (Billions of Cubic Feet)	Years' Supply in Reserve
1935..	62,000	Ralph E. Davis, Consulting	2,408	25.7
1936..	62,000	Engineer	2,571	24.1
1937..	66,000	" " "	2,854	23.1
1938..	70,000	Lyon F. Terry, Chase Nat'l Bank	2,960	23.6
1939	70,000	" " "	3,162	22.1
1940..	85,000	Ralph E. Davis, Consulting Engineer	3,331	25.5
1941..	113,800	Petroleum Administration for War	3,459	32.9
1942..	110,000	" " "	3,701	29.7
1943..	110,000	" " "	4,336	25.4
1944..	133,500	" " "	4,731	28.2
1945..	147,789	American Gas Association	4,840	30.5
1946..	160,576	" "	5,152	31.2
*1947..	165,927	" "	5,650	29.4
1948..	173,869	" "	5,958	29.2
1949..	180,381	" "	6,245	28.9
1950..	185,593	American Gas Association	6,893	26.9
1951..	190,443	World Oil	7,850	24.3

* Beginning of new basis; includes gas stored and lost in transmission.

Almost

LE ROI

Le Roi 3 way Partnership



1. Better Engines

Le Roi's A288, for example. It has a wide speed range of 360 to 720 rpm. Its removable wet cylinder sleeves and other construction features simplify maintenance, reduce replacement costs. No shut-down is necessary for periodic inspections.

2. Better Applications

Exclusive Le Roi distributors are oil-field power specialists. They know engines. That's why they can select the right power unit for any application. That's why you can count on Le Roi for dependable, low-cost power.

3. Better Service

Keeping your Le Roi engines running is the sole responsibility of our distributors. They handle only Le Roi. You get personal attention from engine experts. Large parts-stocks and skilled mechanics assure prompt service and a minimum of down-time.

Indestructible!

Le Roi A288 Pumping Engine

One typical installation shows more than 35,000 hours and it's just beginning its useful life. That's stamina — proof that Le Roi's A288 puts you way ahead of the field!

YOU don't have to pamper this pumping engine. No, sir — not Le Roi's A288. It's built to pump more oil — longer — safer — and with less maintenance — than any other well-pumping engine!

The A288 is the only engine to be recommended by one major pumping-engine user for continuous service *unattended for up to two weeks at a time.*

Here are just a few of the reasons for the A288's unfailing dependability:

- Patented, closed "vaporizing-condensing" cooling system requires almost no make-up water — keeps temperatures high and prevents sludging even in sour-gas areas.
- Heavy flywheel maintains even-speed operation under unbalanced loads.
- You don't have to shut down the A288 for periodic inspections or for adding oil.
- Big crankcase oil capacity permits long intervals between oil filling.
- There are no grease fittings, belts, or other accessories that need attention.

Let your Le Roi distributor tell you more about the A288 — and show you installations. See for yourself why you're way ahead of the field, when you let Le Roi's 3-way partnership work for you.

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

***Plants:* Milwaukee • Cleveland • Greenwich, Ohio — *Oil Field Headquarters:* Tulsa, Oklahoma**

LE ROI

See these Le Roi Distributors for a Profitable 3-way Partnership

Oklahoma
Le Roi Company Branch — Tulsa
Carson Machine & Supply Co.— Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

Illinois — Western Kentucky
Western Machinery & Engine Company—Centralia, Illinois and St. Louis, Missouri.

Typical Le Roi Service Facility

Here's the efficient well-arranged parts department of the Le Roi-Rix Co.'s Long Beach branch. Two more offices — at Bakersfield and Los Angeles — are similarly equipped. All three offices maintain prompt 24-hour service. Le Roi has service facilities like these throughout the oil fields — another reason why you can depend on Le Roi.

Michigan
Hafer Engine Service — Reed City

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

Northern Louisiana & Mississippi
Ingersoll Corporation — Shreveport, Louisiana, and Jackson, Mississippi.

West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Long Beach and Bakersfield, Calif.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

P-111

from sales of utility gas passed $2 billion for the first time as the industry served more customers than ever before.

As a result of this spectacular growth, practically every major industrial area in the U. S. is now served by natural gas. Gas now travels from the lower regions of Texas' Rio Grande Valley to the New England states, and from West Texas and New Mexico to California. Practically every major transmission system in the country expanded last year, and applications for additional expansion during 1952-53 have either been approved or are being considered. Almost 9000 miles were put into operation in the past year. There seem only two limiting factors in natural gas expansion for 1952: (1) availability of steel for line pipe, and (2) availability of sufficient natural gas reserves to warrant new lines or expansion of existing lines. Reserves of natural gas in the U. S. at the end of 1951 were estimated by WORLD OIL to be 190,443 billion cubic feet, a gain of 4850 billion over the previous year. The nation continues to find gas at a faster rate than it is produced.

(See table on page 186)

Estimated Proved Recoverable Reserves of Natural Gas Liquids in the United States, by States

Includes condensate, natural gasoline, and liquefied petroleum gas
(Sources: American Gas Association and American Petroleum Institute)
(Thousands of Barrels of 42 U. S. Gallons)

	Reserves as of Dec. 31, 1949	CHANGES IN RESERVES DURING 1950			RESERVES AS OF DECEMBER 31, 1950			
		Extensions and Revisions	Discoveries of New Fields and New Pools in Old Fields	Net Production	Total (Columns 6 + 7 + 8. Also Columns 1 + 2 + 3 Less Column 4)	Non-Associated	Associated	Dissolved
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Arkansas	55,642	745	230	3,679	52,938	31,997	7,586	13,355
*California	320,275	71,979	250	28,217	363,387	0	137,492	225,895
Colorado	24,190	(—)10,837	0	432	12,921	873	0	12,048
Illinois	26,666	3,003	28	3,438	26,259	28	75	26,156
Indiana	126	34	24	32	152	20	25	107
Kansas	106,405	60,578	341	3,746	163,578	159,702	1,594	2,282
Kentucky	13,245	308	154	1,780	11,927	11,927†	0	0
*Louisiana	596,422	56,492	18,992	28,394	643,512	498,484	97,437	47,591
Michigan	1,203	(—) 75	14	124	1,018	609	0	409
Mississippi	56,407	2,040	100	2,650	55,897	26,558	23,295	6,044
Montana	3,710	81	0	244	3,547	3,547	0	0
Nebraska	37	65	140	7	235	74	107	54
New Mexico	85,719	11,773	1,370	4,965	93,897	30,876	33,211	29,810
Ohio	1,670	108	12	102	1,688	1,688†	0	0
Oklahoma	234,030	61,897	4,922	20,946	279,903	121,708	24,863	133,327
Pennsylvania	2,643	135	68	247	2,599	2,599†	0	0
*Texas	2,143,711	443,190	31,326	122,188	2,496,039	1,434,654	359,067	702,318
Utah	208	(—) 9	0	5	194	194	0	0
West Virginia	12,831	634	212	4,701	8,976	8,976†	0	0
Wyoming	43,863	6,636	0	1,512	48,987	37,675	6,390	4,922
‡Miscellaneous	9	2	0	2	9	0	0	9
Total	3,729,012	707,879	58,183	227,411	4,267,663	2,372,189	691,147	1,204,327

* Includes off shore reserves.
† Not allocated by types but occurring principally in the column shown.
‡ Includes Alabama and Florida.

Natural Gas Customers, Sales, and Revenues

(Source: American Gas Association)

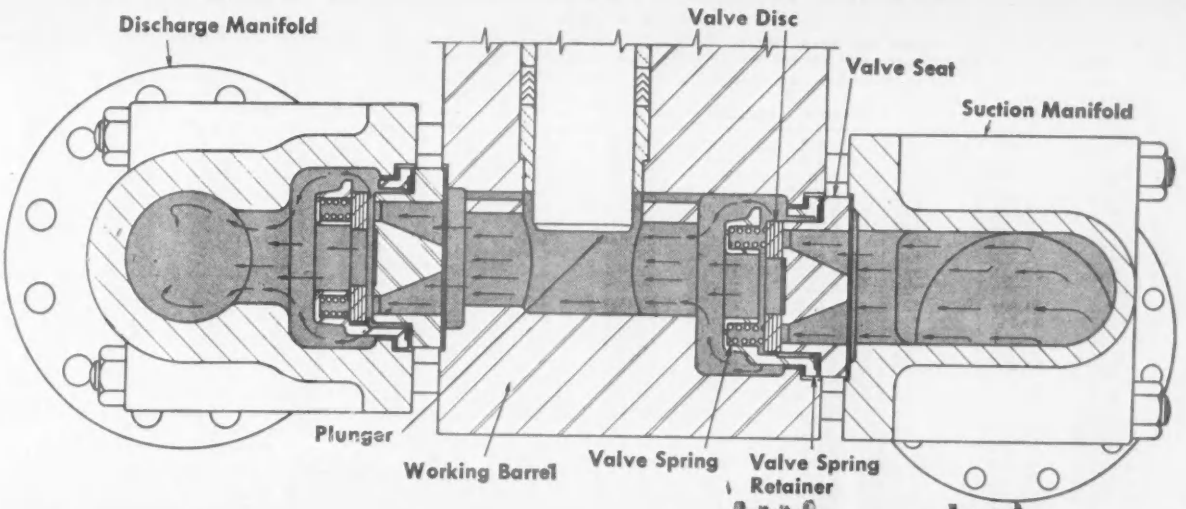
ITEM	Actual 1950	Estimated 1951	Percent Change
Customers, End of Year	15,030,000	17,167,000	+14.2
Residential	13,733,000	15,760,000	+14.3
Commercial	1,180,000	1,324,000	+12.2
Industrial	56,000	64,000	+14.3
Other	11,000	19,000	+72.7
Sales, Thousands of Therms	38,499,900	44,421,000	+15.4
Residential	11,561,600	13,721,000	+18.7
Commercial	3,496,600	3,912,000	+11.9
Industrial	22,234,900	25,322,000	+13.9
Other	1,206,800	1,466,000	+21.5
Revenues	$1,361,005,000	$1,649,050,000	+21.2
Residential	748,762,000	915,520,000	+22.3
Commercial	170,837,000	200,440,000	+17.3
Industrial	420,203,000	504,200,000	+20.0
Other	21,203,000	28,890,000	+36.3

Estimated Proved Recoverable Reserves of Natural Gas in the United States, by States

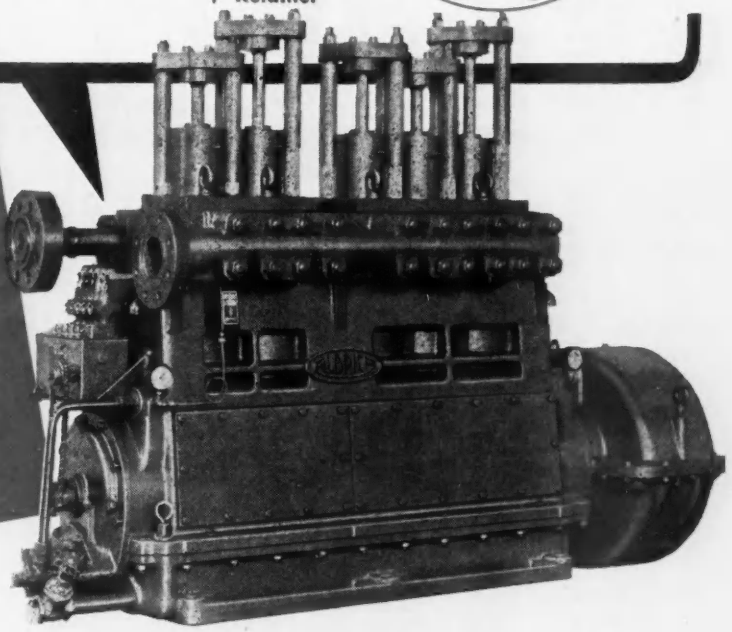
Source: American Gas Association
(Millions of Cubic Feet—14.65 psia, at 60° F.)

	CHANGES IN RESERVES DURING 1950					RESERVES AS OF DECEMBER 31, 1950(b)				
	(b) Reserves as of Dec. 31, 1949	(b) Extensions and Revisions	(b) Discoveries of New Fields and New Pools in Old Fields	(c) Net Change in Underground Storage	(d) Net Production	Total (Columns 7 + 8 + 9 + 10, also Columns 1 + 2 + 3 + 4 Less Column 5)	(e) Non-Associated	(f) Associated	(g) Dissolved	(h) Underground Storage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Arkansas	874,190	65,072	23,129	540	55,338	907,593	450,935	157,869	296,789	2,000
California (i)	9,991,635	225,279	71,840	4,028	532,396	9,760,386	2,702,746	2,286,788	4,751,693	19,159
Colorado	1,227,095	(—)134,453	41,426	0	18,595	1,115,473	474,704	33,528	607,241	0
Illinois	233,192	26,774	5,700	0	35,773	229,893	5,643	15,000	209,250	0
Indiana	25,200	6,720	4,920	750	6,400	31,190	4,000	5,000	21,440	750
Kansas	14,089,560	64,729	30,360	153	393,968	13,790,834	13,381,105	152,189	228,239	29,301
Kentucky	1,349,397	49,294	8,200	(—)908	75,400	1,330,583	1,254,997	0	64,000	11,586
Louisiana (i)	26,687,811	2,010,120	751,133	0	915,798	28,533,266	22,477,745	4,162,574	1,892,947	0
Michigan	214,911	(—)14,820	2,741	10,528	18,286	195,074	121,867	0	40,906	32,301
Mississippi	2,528,969	130,470	5,030	0	145,263	2,519,206	1,772,969	410,436	335,801	0
Montana	803,471	34,951	0	2,402	43,463	797,361	722,647	44,799	25,421	4,494
Nebraska	8,063	9,028	28,073	0	1,058	44,106	14,886	21,213	8,007	0
New Mexico	6,241,003	866,625	124,404	6,883	248,245	6,990,670	3,978,271	2,098,103	896,210	18,086
New York	66,685	200	0	1,094	3,200	64,779	53,375	0	595	10,809
Ohio	652,571	38,751	7,900	6,840	47,200	658,862	550,548	0	34,500	73,814
Oklahoma	11,625,979	486,813	121,163	8,250	607,918	11,634,287	7,509,209	1,011,782	3,088,927	24,369
Pennsylvania	621,680	31,000	50,000	(—)509	75,000	627,171	528,569	0	40,750	57,852
Texas (i)	99,170,403	5,055,893	1,557,691	490	3,380,400	102,404,077	71,529,387	17,646,015	13,228,185	490
Utah	65,577	8,196	15,112	0	4,133	84,752	76,331	0	8,421	0
West Virginia	1,715,233	105,152	21,750	13,540	205,000	1,650,675	1,513,009	0	81,500	56,166
Wyoming	2,173,677	96,631	2,749	220	78,288	2,194,989	1,481,156	128,456	584,864	513
Miscellaneous (a)	15,042	9,956	4,030	0	1,556	27,472	24,356	0	3,116	0
Total	180,381,344	9,172,381	2,877,351	54,301	6,892,678	185,592,699	130,628,455	28,173,752	26,488,802	341,690

(a) Includes Alabama, Florida, Maryland, Missouri, North Dakota and Virginia. (b) Excludes gas loss due to natural gas liquids recovery. (c) The net difference between gas stored in and gas withdrawn from underground storage reservoirs. (d) Net production equals gross withdrawals less gas injected into underground reservoirs; changes in underground storage are excluded. December production estimated occasionally. (e) Non-associated gas is free gas not in contact with crude oil in the reservoirs. (f) Associated gas is free gas in contact with crude oil in the reservoirs. (g) Dissolved gas is gas in solution with crude oil in the reservoirs. (h) Gas held in underground reservoirs for storage purposes only. (i) Includes off-shore reserves.



ENGINEERS: Check these points of Aldrich Direct Flow Design



Aldrich engineers eliminated two right-angle turns in the fluid-end. Now, liquid passes from suction to discharge manifold in a *straight line.* That gave the Direct Flow Pump its name, and set up a whole new concept of pumps, pumping, and pump maintenance. It all adds up as follows:

☐ **Increased operating speeds**—you get whatever volume and pressure you need *from a smaller, lighter, more compact pump.*

☐ **Sectionalized construction**—parts can be replaced at a fraction of the cost of a new fluid-end; also, parts can be made of stainless, bronze, Monel or other special materials—extremely important for corrosive fluid service.

☐ **Maintenance made easier**—no more tapered bores in the working barrel. Manifolds are *not* taken off but slide out on studs—affording room to *lift out* valves as complete units. Packing is easily renewed—note accessibility of stuffing boxes.

☐ **Interchangeable wearing parts**—available among 3, 5, 7 and 9 plunger pumps of same stroke size. This minimizes spare parts costs and inventories.

☐ **Changeable plunger sizes**—in many cases it is only necessary to add new plungers, glands, throat bushings and packing *to the same fluid-end.*

☐ **Drive direct**—by connection to synchronous engine type motor or internal combustion engine; also with integral speed reducer or V-belts.

Contact your Aldrich Representative . . . or write to us direct for complete details on 3", 5" or 6" stroke units.

THE ALDRICH PUMP COMPANY

4 PINE STREET • ALLENTOWN, PENNSYLVANIA

...Originators of the Direct Flow Pump

Representatives: P. H. Arden, P. O. Box 185, Glenview, Ill. • Bushnell Controls & Equipment Co., 3929 W. Jefferson Blvd., Los Angeles 16, Calif. • L. T. Gibbs, 509 Petroleum Bldg., Tulsa 3, Okla. • R. B. Moore Supply Co., Inc., Bolivar, N. Y. • Power Specialty Co., 2000 Kipling St., Houston 6, Texas • Reeves & Skinner Machinery Co., 2211 Olive St., St. Louis 3, Mo. Stearns-Roger Manufacturing Co., 1720 California St., Denver 2, Colo. • Export Sales: Petroleum Machinery Corp., 30 Rockefeller Plaza, New York 20, N. Y. • Birmingham • Boston Buffalo • Cincinnati • Cleveland • Detroit • Duluth • Jacksonville • Omaha • Philadelphia • Pittsburgh • Portland, Ore. • Richmond, Va. • San Francisco • Seattle • Spokane, Wash. • Syracuse

United States Marketed Production of Natural Gas, By States, By Years

(Millions of Cubic Feet)

Sources: U. S. Bureau of Mines, except for some figures for early years which are from "Petroleum in the United States and Possessions" by Ralph Arnold and William Kemnitzer, and except where otherwise indicated by footnotes.

YEAR	Arkansas	California	Colorado	Illinois	Indiana	Kansas	Kentucky	Louisiana	Michigan	Mississippi	Montana	New Mexico	New York
*Pre–1906	281	9,810	631	1,505	471,800	81,865	13,243	31	.....	.....	.....	.....	31,340
1906	21	153	23	410	7,861	69,323	789	39	.....	.....	.....	.....	2,548
1907	*570	230	57	1,155	6,624	76,707	1,303	88	.....	.....	.....	.....	3,288
1908	*1,208	479	50	4,979	5,256	80,740	1,430	252	.....	.....	.....	.....	3,843
1909	*1,778	2,324	*45	8,473	6,159	75,074	2,097	1,365	1	.....	.....	.....	4,696
1910	*2,412	2,764	*40	6,723	5,760	59,380	1,357	4,110	1	.....	.....	.....	6,010
1911	*1,994	6,390	*35	6,762	4,365	38,800	1,275	9,786	2	.....	.....	.....	5,240
1912	*1,465	9,355	*30	5,603	3,618	28,068	1,951	14,493	2	.....	.....	.....	8,626
1913	*806	11,035	*27	4,767	2,921	22,884	1,821	26,653	2	.....	.....	.....	8,515
1914	*633	17,829	*24	3,548	2,580	22,628	1,422	26,775	2	.....	.....	.....	8,935
1915	992	21,891	*21	2,690	2,261	27,046	1,667	25,540	2	.....	6	.....	7,977
1916	2,388	31,643	*18	3,534	1,715	31,710	2,107	32,081	1	.....	213	.....	8,036
1917	5,610	49,427	*14	4,439	1,712	24,439	2,802	31,287	1	.....	334	.....	8,372
1918	5,295	39,719	10	4,473	1,667	27,825	3,022	36,094	1	.....	177	.....	8,461
1919	5,587	55,607	10	3,825	1,407	16,150	2,057	47,062	1	.....	858	.....	8,124
1920	9,027	66,041	8	3,013	1,779	21,158	3,345	58,274	.....	.....	818	.....	8,419
1921	4,260	75,942	4	2,646	1,066	15,717	4,820	58,004	.....	.....	336	.....	6,583
1922	9,700	84,580	4	3,383	947	20,289	5,872	70,267	1	.....	486	.....	6,947
1923	24,215	131,434	1	4,049	880	30,913	11,953	112,031	1	.....	1,470	.....	6,497
1924	36,616	189,692	48	4,072	998	25,580	12,875	160,945	1	.....	1,071	.....	6,196
1925	41,878	187,789	574	4,165	1,168	26,917	10,770	152,620	.....	.....	1,496	.....	6,210
1926	43,566	204,915	554	3,808	901	38,095	10,410	157,423	.....	.....	2,283	921	7,027
1927	30,450	212,364	1,725	3,741	1,124	42,646	10,206	186,961	1	.....	4,253	1,019	5,908
1928	20,235	246,215	2,931	3,051	1,290	45,644	15,383	227,821	469	.....	6,277	838	7,224
1929	19,928	342,214	2,787	2,983	1,012	38,469	27,588	261,138	4,526	90	9,659	3,054	8,387
1930	18,585	334,789	3,312	2,890	1,217	37,630	28,023	278,341	2,075	179	10,060	9,497	9,624
1931	13,300	305,930	2,536	2,130	1,337	38,742	27,870	224,155	472	6,048	10,949	19,354	7,868
1932	10,235	263,484	2,547	1,769	1,349	40,690	29,005	201,561	968	8,648	13,295	17,604	8,813
1933	8,288	259,799	2,449	1,631	1,544	41,596	31,380	197,826	1,528	8,679	14,391	19,148	6,865
1934	7,024	268,122	2,633	1,868	1,802	46,909	33,124	225,713	2,789	8,245	14,971	24,075	6,278
1935	6,167	284,109	2,843	1,448	1,777	57,125	39,738	249,450	4,203	9,643	19,870	27,931	8,288
1936	8,500	320,406	3,687	865	2,241	69,178	43,903	290,151	7,167	11,821	23,003	33,928	12,431
1937	9,690	329,769	3,186	1,040	1,551	83,890	55,719	315,301	9,080	13,348	24,765	46,337	21,325
1938	11,301	315,168	1,904	1,169	1,299	75,203	46,163	283,899	10,165	13,656	21,216	50,706	39,402
1939	10,107	348,361	2,015	2,746	791	80,556	47,771	294,370	10,726	14,527	23,178	60,284	29,222
1940	14,379	351,950	2,533	8,359	1,137	90,003	53,056	343,191	12,648	6,365	26,231	63,990	12,187
1941	19,148	374,905	3,256	10,053	1,522	111,121	69,067	403,855	13,916	4,268	28,499	64,655	10,456
1942	19,456	403,968	4,865	14,484	1,599	112,921	80,089	447,686	15,521	2,082	31,475	78,164	8,718
1943	36,469	457,757	6,445	18,120	1,450	133,729	92,364	505,294	18,006	1,461	31,562	86,500	8,062
1944	46,453	502,017	5,141	18,137	1,014	157,733	94,223	534,688	19,653	1,352	32,102	87,727	7,052
1945	46,600	502,442	4,914	16,663	1,543	145,959	81,714	542,789	21,874	4,587	31,829	105,023	9,210
1946	45,177	487,904	6,728	17,166	1,094	165,725	70,396	525,178	20,879	7,225	30,713	119,262	5,084
†*1947*	*50,440*	*544,950*	*8,259*	*16,679*	*666*	*202,177*	*80,040*	*573,151*	*25,479*	*39,087*	*32,549*	*142,566*	*4,776*
‡1947	50,630	560,510	8,392	17,023	877	209,321	96,459	581,398	18,812	40,037	34,282	142,740	4,600
1948	53,946	570,954	8,967	14,062	553	245,189	70,095	686,061	14,981	59,899	36,551	194,749	4,705
1949	47,788	550,903	8,490	12,391	334	294,078	51,851	732,845	14,753	68,062	35,291	204,961	3,693
1950	48,047	558,398	11,168	13,285	956	364,024	73,316	831,771	11,250	114,153	39,186	212,909	3,336
1951	47,400	533,500	12,500	13,500	1,000	387,900	52,900	998,400	11,100	147,800	34,500	292,200	3,500
Total	849,605	10,884,987	120,182	288,596	564,858	3,977,289	1,419,791	11,395,063	247,581	552,175	597,656	1,967,576	424,128

YEAR	Ohio	Oklahoma	Pennsylvania	Texas	West Virginia	Wyoming	Others	Total United States	VALUE AT WELLS		VALUE AT POINTS OF CONSUMPTION	
									Total (Thousands of Dollars)	Average Per M Cubic Ft. (Cts.)	Total (Thousands of Dollars)	Average Per M Cubic Ft. (Cts.)
*Pre–1906	305,593	2,215	1,611,066	815	387,799	506	43,281	**961,781**	.....	....	426,448	14.4
1906	45,436	3,520	138,161	*1,000	119,400	*100	59	**388,843**	.....	....	46,874	12.1
1907	52,041	4,867	135,516	*1,200	122,687	*140	149	**406,622**	.....	....	54,222	13.3
1908	47,442	11,925	130,476	*1,500	112,181	*180	200	**402,141**	.....	....	54,640	13.6
1909	53,223	28,037	127,697	*3,000	166,435	*220	82	**480,706**	.....	....	63,207	13.1
1910	48,232	50,430	126,867	*4,000	190,706	*253	110	**509,155**	.....	....	70,756	13.9
1911	49,450	67,276	108,869	5,503	206,891	*265	90	**512,993**	.....	....	74,622	14.5
1912	56,210	73,799	112,150	7,470	239,007	*247	109	**562,203**	.....	....	84,564	15.0
1913	50,612	75,018	118,860	12,160	245,454	*273	90	**581,898**	.....	....	87,847	15.1
1914	68,270	78,167	110,745	13,434	236,489	*306	80	**591,867**	.....	....	94,116	15.9
1915	79,510	87,517	113,692	13,324	244,004	*321	118	**628,579**	.....	....	101,312	16.1
1916	69,888	123,517	130,484	15,810	299,319	*557	149	**753,170**	.....	....	120,227	16.0
1917	68,917	137,384	133,397	17,047	308,617	*1,209	102	**795,110**	.....	....	142,089	17.9
1918	61,261	124,317	123,813	13,440	265,161	4,339	1,926	**721,001**	.....	....	153,554	21.3
1919	63,153	163,649	113,489	24,710	234,095	6,014	118	**745,916**	.....	....	160,888	21.6
1920	58,938	154,467	125,787	37,063	239,719	10,312	42	**798,210**	.....	....	196,194	24.6
1921	47,412	124,058	86,144	44,504	174,921	15,608	27	**662,052**	.....	....	174,617	26.4
1922	51,481	140,631	101,276	47,945	195,288	23,427	22	**762,546**	84,873	11.1	221,535	29.1
1923	53,812	203,082	112,562	74,535	203,867	35,523	151	**1,006,976**	100,849	10.0	240,001	23.8
1924	47,396	214,452	105,863	107,247	182,285	46,036	148	**1,141,521**	105,779	9.3	253,856	22.2
1925	43,235	249,285	101,632	134,872	180,345	45,539	76	**1,188,571**	112,047	9.4	265,271	22.3
1926	47,363	286,421	107,089	175,392	180,223	46,567	61	**1,313,019**	124,693	9.5	300,168	22.9
1927	51,381	326,864	105,709	254,063	162,375	43,582	1,056	**1,445,428**	127,468	8.8	317,930	22.0
1928	56,341	320,861	99,466	301,990	163,018	47,490	1,595	**1,568,139**	139,898	8.9	363,726	23.2
1929	57,936	357,893	101,951	464,928	167,333	44,648	1,169	**1,917,693**	157,596	8.2	413,276	21.6
1930	63,394	348,116	88,706	517,880	144,180	43,219	1,704	**1,943,421**	147,048	7.6	416,090	21.4
1931	56,326	263,685	74,797	464,580	124,797	39,770	1,790	**1,686,436**	117,505	7.0	392,816	23.3
1932	51,466	255,487	61,611	456,832	100,540	28,938	1,148	**1,555,990**	98,985	6.4	384,632	24.7
1933	47,929	245,759	63,579	475,691	100,653	25,830	909	**1,555,474**	97,096	6.2	368,540	23.7
1934	50,330	254,457	86,238	602,976	109,161	23,148	858	**1,770,721**	106,438	6.0	395,378	22.3
1935	49,592	274,313	94,464	642,366	115,772	26,643	853	**1,916,595**	110,402	5.8	429,374	22.4
1936	46,994	280,481	110,362	734,561	138,076	29,322	725	**2,167,802**	119,193	5.5	476,813	22.0
1937	42,783	296,260	115,928	854,561	149,084	31,023	2,980	**2,407,620**	123,457	5.1	528,354	21.9
1938	35,257	263,164	76,547	882,473	134,342	26,678	5,850	**2,295,562**	113,571	4.9	500,698	21.8
1939	36,469	250,875	93,882	979,427	159,226	26,614	5,609	**2,476,756**	120,243	4.9	534,240	21.6
1940	40,639	257,626	90,725	1,063,538	188,751	27,346	5,568	**2,660,222**	120,493	4.5	577,939	21.7
1941	41,858	234,054	92,819	1,086,312	207,681	29,284	5,929	**2,812,658**	138,508	4.9	621,333	22.1
1942	45,055	269,704	93,532	1,170,345	215,193	33,124	5,494	**3,053,475**	154,236	5.1	692,737	22.7
1943	52,001	285,045	93,543	1,323,885	223,787	34,351	4,858	**3,414,689**	176,893	5.2	760,950	22.3
1944	51,724	310,888	92,987	1,525,515	181,452	34,521	6,660	**3,711,039**	189,809	5.1	794,271	21.5
1945	49,967	357,530	82,188	1,711,401	160,225	35,282	6,946	**3,918,686**	191,006	4.9	834,195	21.4
1946	61,570	380,938	92,443	1,776,148	178,958	33,266	4,751	**4,030,605**	212,251	5.3	882,356	22.0
†*1947*	*73,989*	*393,216*	*94,252*	*1,932,857*	*182,072*	*40,083*	*6,505*	*4,444,693*	*266,682*	*6.0*	*1,031,169*	*23.2*
‡1947	68,946	419,010	91,971	1,992,704	192,233	45,550	6,678	**4,582,173**	274,709	6.0	1,028,318	23.2
1948	65,619	480,573	87,578	2,289,923	203,681	52,424	7,510	**5,148,020**	333,173	6.5	1,193,559	24.1
1949	46,512	435,262	84,739	2,588,921	181,176	50,815	6,871	**5,419,736**	341,443	6.3	1,320,671	25.4
1950	43,163	482,360	91,137	3,126,402	189,980	62,062	5,157	**6,282,060**	408,776	6.5	1,597,930	26.5
1951	39,800	587,600	103,300	3,712,100	186,800	67,500	18,450	**7,251,750**	478,615	6.6	1,885,000	27.0
Total	2,721,927	10,642,839	6,345,837	31,755,493	8,813,367	1,180,372	158,308	**94,907,630**	§	§	22,621,759	20.8

* Estimate. † Old basis, as in prior years; excludes gas stored and lost in transmission; not included below in totals. ‡ New basis, as in subsequent years; includes gas stored and lost in transmission; included below in totals. § Not available.

JONES SUCKER RODS

Endurance and uniformity are added to all Jones Sucker rods by controlled full length normalizing. Forging strains and heat demarcations are removed. Grain structure is refined.

Physicals of Jones nickel alloy rods are improved by both normalizing and tempering.

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

THE S. M. JONES COMPANY
Division of Buffalo-Eclipse Corporation
General Office and Factory: TOLEDO, OHIO
Sales Office: Kennedy Building, Tulsa, Okla.
Export Sales Office: Buffalo International Corp.
50 Church Street, N. Y. C.

LOOK FOR THE GREEN RODS

Natural Gasoline

Daily Output Passes 1/2 Million Mark

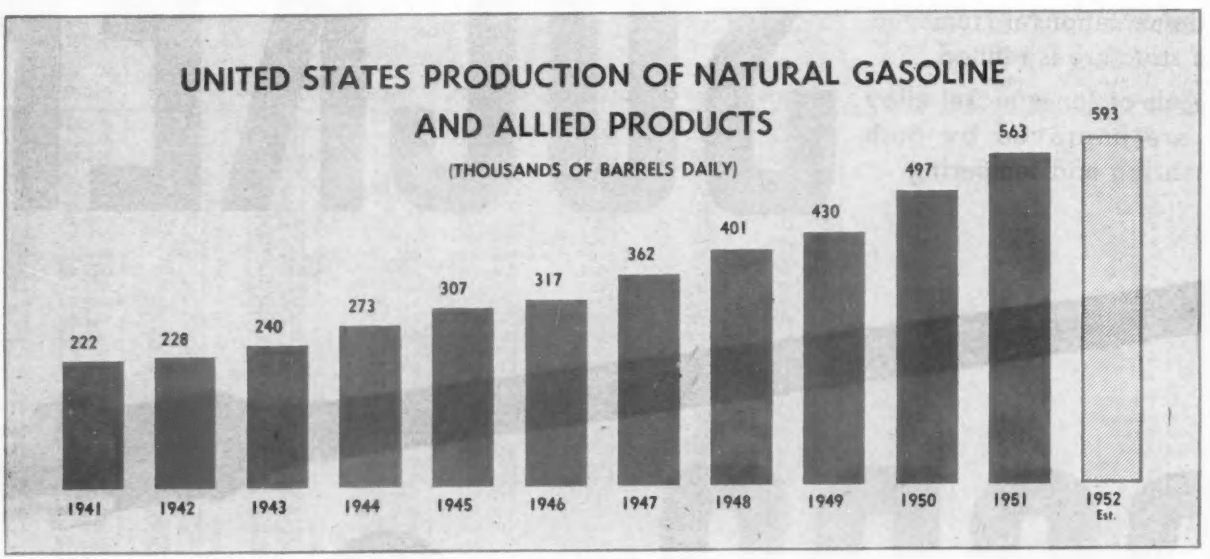
PRODUCTION and processing of natural gasoline and allied products experienced a healthy gain during the past year with the daily average figure edging over the 1/2 million mark. Output of natural gasoline and allied products jumped 13.2 percent, the gross production having been 205,501,000 barrels or an average of 563,016 barrels per day.

Pace in the expansion of natural gasoline facilities continued to quicken, although not at the rate reported for the previous year, 1950. The forthcoming year likely will see the output approach a daily average of 592,896 barrels. Reduced momentum in products gain is being governed by the fact that the end of World War II saw a scrimmage for allocated materials needed in the completion of proposed plant projects. By now, the expansion program has largely been completed.

International unrest will undoubtedly place additional demands upon natural gasoline producing facilities; however, the scarcity and allocation of fabricating metals will stalemate plans for expansion programs.

Statewise, Texas copped the lead for the production of natural gasoline and allied products during 1951. Increasing from a daily average of 256,400 to 299,000 barrels during the 12-month period, Texas experienced the most significant increase in the state's history. The 1951 output nearly doubled the cumulative production up to 1941. Stemming from the increased processing facilities found in the state, the figure for 1951 represents a large slice of the total increase for the continental U. S.

Second in the count of increases was Oklahoma with a rise from an average of 40,200 barrels per day in 1950, to 46,900 for 1951. Not far behind was Louisiana, whose plants flowed an average of 61,000 barrels per day in 1951 as compared to 56,100 for the former year.



(All Figures in Barrels)

YEAR	Annual Production	Daily Average	YEAR	Annual Production	Daily Average	YEAR	Annual Production	Daily Average
						(* Natural Gasoline and Allied Prod.		
1918	6,727,000	18,430	1931	43,617,000	119,499	1941	80,855,000	221,521
1919	8,370,000	22,931	1932	36,281,000	99,128	1942	83,222,000	228,279
1920	9,161,000	25,029	1933	33,810,000	92,630	1943	87,716,000	240,318
1921	10,713,000	29,350	1934	36,556,000	100,154	1944	100,046,000	273,350
1922	12,044,000	32,997	1935	39,333,000	107,762	1945	112,004,000	306,861
1923	19,434,000	53,244	1936	42,770,000	116,858	1946	115,739,000	317,093
1924	22,235,000	60,751	1937	49,177,000	134,732	1947	132,173,000	362,118
1925	26,845,000	73,547	1938	51,347,000	140,677	1948	146,721,000	400,877
1926	32,455,000	88,917	1939	51,650,000	141,507	1949	157,086,000	430,373
1927	39,075,000	107,054	1940	55,700,000	152,186	1950	181,559,000	497,422
1928	43,191,000	118,009				1951	205,501,000	563,016
1929	53,183,000	145,707				1952 Est.	217,000,000	592,896
1930	52,631,000	144,194						

* Bureau began a new series covering 1941 and subsequent year, which includes cycle condensate

Production of Natural Gasoline and Allied Products, by States, by Years

(Natural Gasoline, Cycle Products, and Liquefied Petroleum Gases)
(THOUSANDS OF BARRELS)

YEAR	Arkansas	California	Colorado	Illinois	Kansas	Kentucky	Louisiana	Michigan	Mississippi	Montana	New Mexico
Natural Gasoline:											
1911	.....	1	.....	4	.....	.....	.....	....	....	....	....
1912	.....	25	.....	7	.....	.....	.....	....	....	....	....
1913	.....	82	.....	14	.....	.....	.....	....	....	....	....
1914	.....	180	.....	28	.....	.....	.....	....	....	....	....
1915	.....	306	.....	25	1	.....	5	....	....	....	....
1916	.....	409	.....	54	5	17	50	....	....	....	....
1917	.....	686	.....	117	28	91	119	....	....	....	....
1918	.....	768	.....	109	57	79	167	....	....	....	....
1919	.....	962	.....	144	78	122	240	....	....	....	....
1920	.....	1,148	.....	144	103	107	253	....	....	....	....
1921	.....	1,386	.....	179	85	101	365	....	....	....	....
1922	102	1,598	.....	185	68	124	700	....	....	....	....
1923	385	4,127	.....	175	209	181	969	....	....	....	....
1924	418	5,538	.....	216	278	173	1,145	....	....	....	....
1925	469	7,219	1	235	466	183	1,035	....	....	....	....
1926	723	9,271	7	238	604	183	1,037	....	....	....	35
1927	893	11,858	22	211	859	178	1,068	....	....	....	44
1928	778	13,907	45	186	875	173	1,310	....	....	....	36
1929	796	20,008	39	169	863	143	1,547	....	....	....	25
1930	730	19,754	31	164	836	158	1,755	....	....	....	87
1931	626	16,198	16	120	778	130	1,382	....	....	....	423
1932	444	13,140	11	109	590	116	1,100	....	....	....	417
1933	362	11,817	10	87	592	108	880	4	....	31	456
1934	310	12,054	15	91	664	99	966	14	....	30	518
1935	311	12,729	10	63	774	142	1,184	44	....	41	466
1936	285	14,128	11	56	899	143	1,731	48	....	49	689
1937	269	14,855	10	61	1,358	175	2,534	57	....	54	911
1938	611	15,736	9	58	1,333	167	2,277	86	....	42	1,181
1939	587	14,458	9	95	1,481	185	2,240	71	....	51	1,303
1940	764	13,988	9	511	1,541	228	2,708	93	....	62	1,326
1941	669	13,741	9	1,306	1,736	245	4,786	135	....	61	1,645
Cumulative	10,532	252,077	264	5,161	17,161	3,743	33,553	552	....	421	9,562
Natural Gasoline and Allied Products:											
1941	819	15,709	9	2,218	2,040	842	5,374	135	....	94	1,929
1942	1,016	15,079	8	3,317	1,948	873	7,049	60	....	108	2,123
1943	1,353	16,508	†	4,417	2,029	1,031	7,287	29	....	111	1,929
1944	1,798	18,364	†	4,628	1,663	1,161	11,730	202	....	114	1,932
1945	2,046	21,232	†	4,190	1,729	1,116	13,077	324	....	112	2,329
1946	2,012	21,679	20	3,847	1,966	1,282	13,495	294	....	109	2,468
1947	2,240	25,336	24	3,869	2,362	1,422	14,973	102	475	137	2,692
1948	2,259	26,549	33	3,539	2,561	1,566	16,901	62	1,123	201	3,103
1949	2,280	27,154	342	3,218	2,647	1,620	19,254	86	1,271	230	4,025
1950	2,342	28,202	†	3,088	3,663	1,790	20,497	78	1,291	248	5,098
1951	2,412	29,500	†	3,011	4,089	1,811	22,273	39	1,189	267	5,634
1950 Daily Average	6.4	77.3	.....	8.4	10.0	5.0	56.1	0.2	3.5	0.7	14.0
1951 Daily Average	6.6	80.8	.....	8.2	11.2	5.0	61.0	0.1	3.3	0.7	15.4

YEAR	New York	Ohio	Oklahoma	Pennsylvania	Texas	Utah	West Virginia	Wyoming	Others	Total	VALUE AT PLANT $ Thous.	VALUE AT PLANT $ Gal.
Natural Gasoline:												
1911	....	40	9	35	.....	....	87	.....	1	177	$ 532	7.2
1912	....	41	37	49	.....	....	127	.....	2	288	1,157	9.6
1913	....	49	154	88	.....	....	183	.....	3	573	2,458	10.2
1914	....	58	410	110	.....	....	221	.....	7	1,014	3,106	7.3
1915	....	52	754	140	3	....	258	.....	12	1,556	5,151	7.9
1916	6	63	1,151	231	31	....	447	.....	....	2,464	14,331	13.8
1917	4	130	2,741	329	165	....	778	.....	....	5,188	40,189	18.4
1918	5	161	3,898	376	174	....	895	38	....	6,727	50,364	17.8
1919	11	209	4,524	483	222	....	1,242	133	....	8,370	64,197	18.3
1920	10	238	4,259	504	784	....	1,403	207	....	9,160	71,788	18.7
1921	9	217	4,413	473	1,837	....	1,301	347	....	10,713	61,815	13.7
1922	12	205	4,510	441	2,272	....	1,352	475	....	12,044	72,711	14.4
1923	10	239	6,435	455	4,233	....	1,509	507	....	19,434	77,268	9.5
1924	11	225	7,168	458	4,442	....	1,466	697	....	22,235	82,233	8.8
1925	10	207	9,306	449	5,098	....	1,385	780	1	26,844	120,383	10.7
1926	13	258	11,327	484	5,788	....	1,519	967	1	32,455	136,412	10.0
1927	11	289	13,050	399	7,636	....	1,528	1,029	....	39,075	118,688	7.2
1928	9	314	14,755	395	7,727	....	1,660	1,020	1	43,191	138,944	7.7
1929	6	266	16,096	438	9,987	....	1,738	1,061	1	53,183	158,410	7.1
1930	5	213	14,076	398	11,698	....	1,508	1,217	1	52,631	128,160	5.8
1931	3	124	10,831	341	10,159	....	1,258	1,227	1	43,617	63,732	3.5
1932	3	123	9,014	278	8,836	....	1,042	1,057	1	36,281	49,244	3.2
1933	2	111	8,583	278	8,727	....	949	813	....	33,810	54,368	3.8
1934	2	140	8,462	257	11,109	....	997	828	....	36,556	60,523	3.9
1935	1	148	9,045	301	12,304	....	1,010	768	....	39,333	70,940	4.3
1936	....	166	9,967	340	12,394	....	1,057	807	....	42,770	84,572	4.7
1937	1	183	11,721	332	14,650	....	1,199	807	....	49,177	97,125	4.7
1938	1	176	11,155	254	16,331	....	1,200	730	....	51,347	87,266	4.0
1939	1	177	10,384	280	18,334	....	1,245	749	....	51,650	90,050	4.2
1940	....	192	9,509	366	22,191	....	1,400	812	....	55,700	68,261	2.9
1941	....	196	8,625	368	28,100	....	1,568	827	....	64,017	105,815	3.9
Cumulative	146	5,210	226,369	10,130	225,232	....	33,532	17,903	32	851,580	$2,180,193	6.1
Natural Gasln. and Allied Products:												
1941	....	196	10,795	381	37,116	....	2,334	864	....	80,855	119,120	3.5
1942	....	166	10,598	364	37,330	....	2,425	858	....	83,322	121,565	3.5
1943	....	155	10,055	417	39,191	....	2,332	†872	....	87,716	146,910	4.0
1944	....	173	10,042	417	44,534	....	2,117	†1,171	....	100,046	183,500	4.3
1945	....	154	9,909	338	52,103	....	2,086	†1,258	....	112,004	187,564	4.0
1946	....	149	9,881	262	54,357	14	2,868	1,036	....	115,739	180,281	3.7
1947	....	168	10,631	310	62,844	14	3,364	1,210	....	132,173	294,994	5.3
1948	....	150	11,178	291	72,116	14	3,637	1,438	....	146,721	458,977	7.4
1949	....	123	12,486	244	77,031	10	3,760	1,305	....	157,096	376,064	5.7
1950	....	103	14,686	247	93,580	†	4,748	†1,898	....	181,559	425,886	5.6
1951	....	80	17,135	203	109,123	†	6,187	†2,548	....	205,501	535,496	6.2
1950 Daily Average	....	0.3	40.2	0.7	256.4	....	13.0	5.2	....	497.4	.....	....
1951 Daily Average	....	0.2	46.9	0.6	299.0	....	17.0	7.0	....	563.0	.....	....

* Estimate. † Wyoming includes drip gasoline in Colorado in 1943, 1944 and 1945, and in Colorado and Utah in 1950 and 1951.

Petroleum Reserves

Expansion

Estimated Changes in U. S. Reserves of Crude Oil (Only) in 1951, by States

Sources: Reserves beginning of 1951 from American Petroleum Institute; reserves proved in 1951 estimated by WORLD OIL; production in 1951 from Bureau of Mines except November and December from A.P.I.

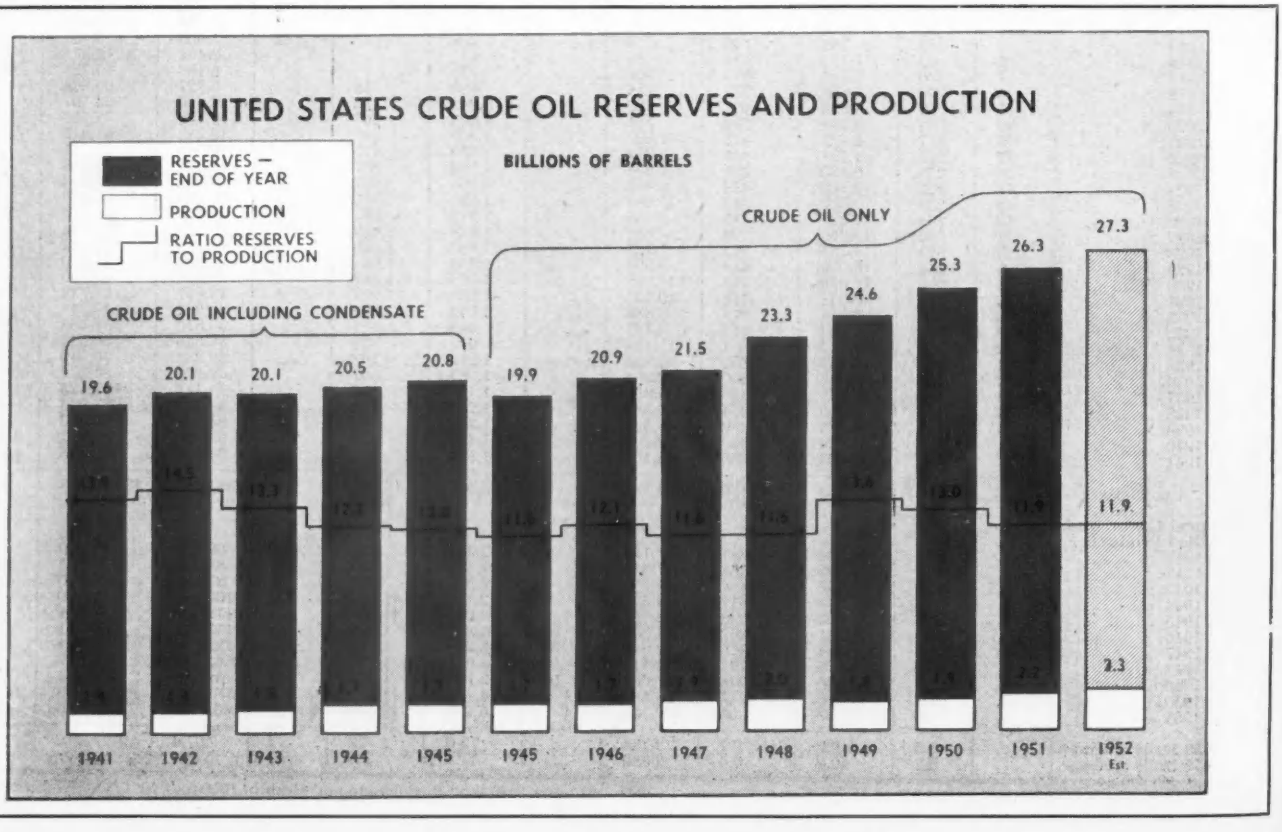
(THOUSANDS OF BARRELS)

STATE	Estimated Proved Reserves Beginning 1951	CHANGES DURING YEAR (Addition) Reserves Proved During 1951	CHANGES DURING YEAR (Deduction) *Production During 1951	CHANGES DURING YEAR Net Change in Reserves (Increase or Decrease)	Estimated Proved Reserves at End of 1951	Ratio of Year-End Reserves to Year's Production (Year's Supply)
Alabama	5,396	2,380	1,030	+ 1,350	6,746	6.5
Arkansas	341,709	52,875	28,254	+ 24,621	366,330	12.9
California	3,733,562	348,219	353,968	— 5,749	3,727,813	10.5
Colorado	339,529	37,290	27,293	+ 9,997	349,526	12.8
Illinois	564,218	79,779	59,098	+ 20,681	584,899	9.8
Indiana	57,372	13,137	10,685	+ 2,452	59,824	5.5
Kansas	732,187	186,292	114,903	+ 71,389	803,576	6.9
Kentucky	55,871	9,268	11,620	— 2,352	53,519	4.6
Louisiana	2,185,137	291,984	220,301	+ 71,683	2,256,820	10.2
Michigan	78,717	11,978	14,034	— 2,056	76,661	5.4
Mississippi	385,705	42,780	35,696	+ 7,084	392,789	11.0
Montana	111,272	7,627	8,998	— 1,371	109,901	12.2
Nebraska	9,700	17,368	2,531	+ 14,837	24,537	9.6
New Mexico	591,982	58,189	52,718	+ 5,471	597,453	11.3
New York	58,808	.....	4,381	— 4,381	54,427	12.4
North Dakota	.....	200	23	+ 177	177	7.6
Ohio	27,264	2,640	3,121	— 481	26,783	10.1
Oklahoma	1,396,913	256,252	186,859	+ 69,393	1,466,306	5.7
Pennsylvania	106,360	12,680	11,167	+ 1,513	107,873	9.6
Texas	13,581,642	1,669,159	995,093	+ 674,066	14,255,708	14.3
Utah	21,629	4,810	1,344	+ 3,466	25,095	18.6
West Virginia	39,042	3,036	2,741	+ 295	39,337	14.3
Wyoming	841,016	146,298	67,512	+ 78,786	919,802	13.6
*Miscellaneous	3,367	.....	659	— 659	2,708	4.1
TOTAL U. S.	25,268,398	3,254,241	2,214,029	+1,040,212	26,308,610	11.9

* Missouri, Florida, Tennessee, Virginia.

BY DISCOVERING the largest quantity of new oil supply ever found in a single year, the U. S. in 1951 was able to add a substantial amount to its proved unproduced reserves of liquid hydrocarbon (crude and natural gas liquids), despite the production of a record-shattering quantity of oil. As a result, the nation ended 1951 with peak proven reserve of 30,886,247,000 barrels of recoverable petroleum.

The year saw the discovery of an estimated 3,819,591,000 barrels, which was ½ million more than the previous year. With production rising to 2,469,405,000 barrels of crude and natural gas liquids in 1951, the discovery of this large quantity permitted the addition of only 1,350,186,000 barrels to reserves. Although this increase was about 200 million more than the rate of growth in 1951, it was not sufficient to maintain the industry's ratio



Necessary

of reserves to current production. At the end of 1951, U. S. reserves were only 12.5 times larger than the year's production, whereas one year ago reserves amounted to 13.6 barrels for every barrel produced during 1950. This shows the necessity of finding materially greater volumes of petroleum as production expands.

If the industry is to maintain its reserve ratio with production during 1952 it will be necessary to prove the existence of 3,800,000,000 barrels of new oil this year. The larger volume being necessary because of the anticipated gain in production.

Bulk of the U. S. reserves is in crude. At the end of 1951, crude reserves totaled 25,268,398,000 barrels, while natural gas liquids amounted to 4,862,637,000 barrels.

New reserves proven during 1951 consisted of 3,254,241,000 barrels of crude and 565,350 barrels of condensate and other natural gas liquids.

Texas accounted for more than the new crude reserves found during 1951, with 1,669,159,000 barrels, which exceeded its production by 674 million barrels and boosted its remaining reserves to more than 14¼ billion barrels, or more than half of the nation's total.

California continued to rank second in remaining crude reserves with 3,727,813,000 barrels, although finding 5¾ million less than it produced. Louisiana followed with 2,256,820,000 barrels, after discovering 71⅔ million more than it produced in 1951. Oklahoma, the fourth ranking state, had a proved remaining crude reserve of 1,466,306,000 barrels as a result of producing 69⅓ less than the amount of new oil proved to exist.

Large additions were made to crude reserves in Wyoming, with the discovery of 78¾ million barrels more than produced, raising the state's remaining total to 919,802,000 barrels. Kansas did well, adding 71⅓ million barrels to its proved reserves during the year to end up with a total of 803,576,000 barrels.

(*See table on next page*)

Estimated Proved U. S. Reserves of Crude Oil, Natural Gas Liquids and Total Hydrocarbons, by States

(Sources: Crude oil from American Petroleum Institute, natural gas liquids from API and American Gas Association)

(THOUSANDS OF BARRELS)

	Proved Reserves as of Dec. 31, 1949 (1)	Changes in Proved Reserves Due to Extensions (New Crude Oil) and Revisions During 1950 (2)	[1]Proved Reserves Discovered in New Fields and in New Pools in Old Fields in 1950 (3)	Production During 1950 (4)	Proved Reserves as of Dec. 31, 1950 (Columns 1 + 2 + 3 Less Column 4) (5)	Changes in Reserves During 1950 (Column 5 Less Column 1) (6)
Crude Oil:						
Alabama	3,547	2,376	116	643	5,396	1,849
Arkansas	297,463	69,163	4,284	29,201	341,709	44,246
California	3,822,751	227,673	10,745	327,607	3,733,562	(—) 89,189
Colorado	344,812	15,215	2,590	23,088	339,529	(—) 5,283
Illinois	468,138	150,509	8,582	63,011	564,218	96,080
Indiana	50,209	7,440	9,969	10,246	57,372	7,163
Kansas	738,390	73,680	27,698	107,581	732,187	(—) 6,203
Kentucky	56,168	7,676	2,415	10,388	55,871	(—) 297
Louisiana	1,909,769	396,285	79,342	200,259	2,185,137	275,368
Michigan	66,496	26,729	1,409	15,917	78,717	12,221
Mississippi	402,860	15,819	2,900	35,874	385,705	(—) 17,155
Montana	112,393	7,141	240	8,502	111,272	(—) 1,121
Nebraska	1,624	5,368	4,033	1,325	9,700	8,076
New Mexico	592,222	31,065	12,418	43,723	591,982	(—) 240
New York	62,900	.....	.....	4,092	58,808	(—) 4,092
Ohio	27,703	2,875	.....	3,314	27,264	(—) 439
Oklahoma	1,329,918	193,331	37,531	163,867	1,396,913	66,995
Pennsylvania	103,356	15,000	.....	11,996	106,360	3,004
Texas	13,509,732	551,170	338,669	817,929	13,581,642	71,910
Utah	15,831	7,000	25	1,227	21,629	5,798
West Virginia	37,992	3,500	350	2,800	39,042	1,050
Wyoming	691,602	188,434	21,600	60,620	841,016	149,414
Miscellaneous[2]	3,613	320	.....	566	3,367	(—) 246
Total United States	24,649,489	1,997,769	564,916	1,943,776	25,268,398	618,909
Natural Gas Liquids[3]:						
Alabama[4]	.....	.....	.....	.....	.....	.....
Arkansas	55,642	745	230	3,679	52,938	(—) 2,704
California	320,275	71,079	250	28,217	363,387	43,112
Colorado	24,190	(—) 10,837	.....	432	12,921	(—) 11,269
Illinois	26,666	3,003	28	3,438	26,259	(—) 407
Indiana	126	34	24	32	152	26
Kansas	106,405	60,578	341	3,746	163,578	57,173
Kentucky	13,245	308	154	1,780	11,927	(—) 1,318
Louisiana	596,422	56,492	18,992	28,394	643,512	47,090
Michigan	1,203	(—) 75	14	124	1,018	(—) 185
Mississippi	56,407	2,040	100	2,650	55,897	(—) 510
Montana	3,710	81	.....	244	3,547	(—) 163
Nebraska	37	65	140	7	235	198
New Mexico	85,719	11,773	1,370	4,965	93,897	8,178
Ohio	1,670	108	12	102	1,688	18
Oklahoma	234,030	61,897	4,922	20,946	279,903	45,873
Pennsylvania	2,643	135	68	247	2,599	(—) 44
Texas	2,143,711	443,190	31,326	122,188	2,496,039	352,328
Utah	208	(—) 9	.....	5	194	(—) 14
West Virginia	12,831	634	212	4,701	8,976	(—) 3,855
Wyoming	43,863	6,636	.....	1,512	48,987	5,124
Miscellaneous[5]	9	2	.....	2	9	.....
Total United States	3,729,012	707,879	58,183	227,411	4,267,663	538,651
Total Liquid Hydrocarbons[6]:						
Alabama[7]	3,547	2,376	116	643	5,396	1,849
Arkansas	353,105	69,908	4,514	32,880	394,647	41,542
California	4,143,026	298,752	10,995	355,824	4,096,949	(—) 46,077
Colorado	369,002	4,378	2,590	23,520	352,450	(—) 16,552
Illinois	494,804	153,512	8,610	66,449	590,477	95,673
Indiana	50,335	7,474	9,993	10,278	57,524	7,189
Kansas	844,795	134,258	28,039	111,327	895,765	50,970
Kentucky	69,413	7,984	2,569	12,168	67,798	(—) 1,615
Louisiana	2,506,191	452,777	98,334	228,653	2,828,649	322,458
Michigan	67,699	26,654	1,423	16,041	79,735	12,036
Mississippi	459,267	17,859	3,000	38,524	441,602	(—) 17,665
Montana	116,103	7,222	240	8,746	114,819	(—) 1,284
Nebraska	1,661	5,433	4,173	1,332	9,935	8,274
New Mexico	677,941	42,838	13,788	48,688	685,879	7,938
New York[7]	62,900	.....	.....	4,092	58,808	(—) 4,092
Ohio	29,373	2,983	12	3,416	28,952	(—) 421
Oklahoma	1,563,948	255,228	42,453	184,813	1,676,816	112,868
Pennsylvania	105,999	15,135	68	12,243	108,959	2,960
Texas	15,653,443	994,360	369,995	940,117	16,077,681	424,238
Utah	16,039	6,991	25	1,232	21,823	5,784
West Virginia	50,823	4,134	562	7,501	48,018	(—) 2,805
Wyoming	735,465	195,070	21,600	62,132	890,003	154,538
Miscellaneous[8]	3,622	322	.....	568	3,376	(—) 246
Total United States	28,378,501	2,705,648	623,099	2,171,187	29,536,061	1,157,560

[1] Only a limited area is assigned to each new discovery, even though the committee may believe that eventually a much larger area will produce; for, in this report, the concern is only with actually proved reserves.

[2] Miscellaneous includes Florida, Missouri, Tennessee and Virginia.

[3] Natural gas liquids include condensate, natural gasoline and liquefied petroleum gases.

[4] Included below in miscellaneous.

[5] Miscellaneous includes Alabama and Florida.

[6] Total liquid hydrocarbons includes crude oil and natural gas liquids (condensate, natural gas liquids and liquefied petroleum gases).

[7] Crude oil only.

[8] Miscellaneous includes Alabama natural gas liquids; Missouri, Tennessee and Virginia crude; and Florida crude and natural gas liquids.

Estimated Proved Reserves of Crude Oil, Natural Gas Liquids, and Total Liquid Hydrocarbons in the United States, by Years

(Sources: Crude oil by American Petroleum Institute; natural gas liquids and total liquid hydrocarbons by API and American Gas Association. Reserves at end of 1936 and for subsequent years estimated by committees on reserves; earlier data estimated by API department of statistics but not based on geological surveys. Data for latest year estimated by WORLD OIL.)

(THOUSANDS OF BARRELS)

YEAR	Estimated Proved Reserves Beginning of Year	CHANGES IN RESERVES DURING YEAR: (ADDITION) RESERVES PROVED DURING YEAR: Revisions of Previous Estimates	Extensions to Old Pools	Total Revisions and Extensions (Cols. 2+3)	New Pools Discovered During Year	Total Reserves Proved During Year (Cols. 4+5)	(Deduction) *Production During Year	(Net Change) Increase or Decrease (Col. 6 — Col. 7)	Estimated Proved Reserves at End of Year (Col. 1 + Col. 8)	Ratio of Year-End Reserves to Year's Prod. (Year's Supply) (Col. 9 ÷ Col. 7)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Crude Oil (Incl. Cycle Plant and Lease Condensate)										
1857–1899	0	.....	.....	.....	.....	†3,439,984	†939,984	††2,500,000	2,500,000	‡43.8
1900	2,500,000	.....	.....	.....	.....	463,621	63,621	+ 400,000	2,900,000	45.6
1901	2,900,000	.....	.....	.....	.....	169,389	69,389	+ 100,000	3,000,000	43.2
1902	3,000,000	.....	.....	.....	.....	288,767	88,767	+ 200,000	3,200,000	36.0
1903	3,200,000	.....	.....	.....	.....	300,461	100,461	+ 200,000	3,400,000	33.8
1904	3,400,000	.....	.....	.....	.....	317 081	117,081	+ 200,000	3.600.000	30.7
1905	3,600,000	.....	.....	.....	.....	334,717	134,717	+ 200,000	3,800,000	28.2
1906	3,800,000	.....	.....	.....	.....	126 494	126,494	.....	3,800,000	30.0
1907	3,800,000	.....	.....	.....	.....	266,095	166,095	+ 100,000	3,900,000	23.5
1908	3,900,000	.....	.....	.....	.....	278,527	178,527	+ 100,000	4,000,000	22.4
1909	4,000,000	.....	.....	.....	.....	383,171	183,171	+ 200,000	4,200,000	22.9
1910	4,200,000	.....	.....	.....	.....	509,557	209,557	+ 300,000	4,500,000	21.5
1911	4,500,000	.....	.....	.....	.....	720,449	220,449	+ 500,000	5,000 000	22.7
1912	5,000,000	.....	.....	.....	.....	622,935	222,935	+ 400,000	5,400,000	23.8
1913	5,400,000	.....	.....	.....	.....	348,446	248,446	+ 100,000	5,500 000	22.1
1914	5,500,000	.....	.....	.....	.....	165,763	265,763	— 100,000	5,400,000	19.9
1915	5,400,000	.....	.....	.....	.....	381,104	281,104	+ 100,000	5,500,000	19.6
1916	5,500,000	.....	.....	.....	.....	700,767	300,767	+ 400,000	5,900,000	19.6
1917	5,900,000	.....	.....	.....	.....	335,316	335,316	.....	5,900,000	17.6
1918	5,900,000	.....	.....	.....	.....	655,928	355,928	+ 300,000	6,200,000	17.4
1919	6,200,000	.....	.....	.....	.....	878,367	378,367	+ 500,000	6,700,000	17.7
1920	6,700,000	.....	.....	.....	.....	942,929	442,929	+ 500,000	7,200,000	16.3
1921	7,200,000	.....	.....	.....	.....	1,072,183	472,183	+ 600,000	7,800 000	16.5
1922	7,800,000	.....	.....	.....	.....	357,531	557,531	— 200,000	7,600,000	13.6
1923	7,600,000	.....	.....	.....	.....	732,407	732,407	.....	7,600,000	10.4
1924	7,600,000	.....	.....	.....	.....	613,940	713,940	— 100,000	7,500,000	10.5
1925	7,500,000	.....	.....	.....	.....	1,763,743	763,743	+1,000,000	8,500,000	11.1
1926	8,500,000	.....	.....	.....	.....	1,070,874	770,874	+ 300,000	8,800,000	11.4
1927	8,800,000	.....	.....	.....	.....	2,601,129	901,129	+1,700,000	10.500,000	11.7
1928	10,500,000	.....	.....	.....	.....	1,401,474	901,474	+ 500,000	11,000,000	12.2
1929	11,000,000	.....	.....	.....	.....	3,207,323	1,007,323	+2,200,000	13,200,000	13.1
1930	13,200,000	.....	.....	.....	.....	1,298,011	898,011	+ 400,000	13,600,000	15.1
1931	13.600 000	.....	.....	.....	.....	251,081	851,081	— 600,000	13,000,000	15.3
1932	13,000,000	.....	.....	.....	.....	85,159	785,159	— 700,000	12,300,000	15.7
1933	12,300,000	.....	.....	.....	.....	605,656	905,656	— 300,000	12,000,000	13.3
1934	12,000,000	.....	.....	.....	.....	1,085,065	908,065	+ 177,000	12.177,000	13.4
1935	12,177,000	.....	.....	.....	.....	1,219,596	996,596	+ 233,000	12,400,000	12.4
1936	12,400,000	.....	.....	.....	.....	1,763,087	1,099,687	+ 663,400	13,063,400	11.9
1937	13,063,400	.....	.....	2,792,790	928,742	3,721,532	1,277,664	+2,443,868	15,507,268	12.1
1938	15.507,268	.....	.....	2,243,571	810,493	3,054,064	1,213,186	+1,840,878	17,348,146	14.3
1939	17,348,146	.....	.....	2,058,455	340,667	2,399,122	1,264,256	+1,134,866	18,483,012	14.6
1940	18,483,012	.....	.....	1,607,012	286,338	1,893,350	1,351,847	+ 541,503	19,024,515	14.1
1941	19,024,515	.....	.....	1,538,989	429,974	1,968,963	1,404,182	+ 564,781	19,589,296	13 9
1942	19.589,296	.....	.....	1,618,925	260,051	1,878,976	1,385,479	+ 493,497	20,082,793	14.5
1943	20,082,793	.....	.....	1,202,368	282,418	1,484 786	1,503,427	— 18,641	20,064,152	13.3
1944	20,064,152	.....	.....	1,556,192	511,308	2,067,500	1,678,421	+ 389,079	20,453,231	12.2
1945	20,453,231	+ 248,891	1,441,424	1,690,315	419,984	2,110,299	1,736,717	+ 373,582	20,826,813	12.0
Crude Oil Only:										
1945	19,784,530	.....	.....	.....	.....	1,870,971	1,713,655	+ 157,316	19,941,846	11.6
1946	19,941,846	+1,254,705	1,158,923	2,413,628	244,434	2,658,062	1,726,348	+ 931,714	20,873,560	12.1
1947	20,873,560	+ 749,278	1,269,862	2,019,140	445,430	2,464,570	1,850,445	+ 614,125	21,487,685	11.6
1948	21,487,685	+1,958,853	1,439,873	3,398,726	396,481	3,795,207	2,002,448	+1,792,759	23,280,444	11.6
1949	23,280,444	+ 603,566	1,693,862	2,297,428	890,417	3,187,845	1,818,800	+1,369,045	24,649,489	13.6
1950	24,649,489	+ 663,378	1,334,391	1,997,769	564,916	2,562,685	1,943,776	+ 618,909	25,268,398	13.0
§1951	25,628,398	.....	.....	.....	.....	3,254,241	‡2,214,029	+1,040,212	26,308,610	11.9
1952 Est.	26,308,610	.....	.....	.....	.....	3,250,000	2,289,000	+ 961,000	27,269,610	11.9
Natural Gas Liquids (Condensate, Natural Gasoline, Liquefied Petroleum Gases):										
1946	.....	.....	.....	.....	.....	.....	.....	.....	3,163,219	.....
1947	3,163,219	.....	.....	192,237	59,301	251,538	160,782	+ 90,756	3,253,975	20.2
1948	3,253,975	.....	.....	405,874	64,683	470,557	183,749	+ 286,808	3,540,783	19.3
1949	3,540,783	.....	.....	294,211	92,565	386,776	198,547	+ 188,229	3,729.012	18.8
1950	3,729,012	.....	.....	707,879	58,183	766,062	227,411	+ 538,651	4,267,663	18.8
§1951	4,267,663	.....	.....	.....	.....	565,350	*255,376	+ 309,974	4,577,637	17.9
1952 Est.	4,577,637	.....	.....	.....	.....	550,000	265,000	+ 285,000	4,862.637	18.3
Total Liquid Hydrocarbons:										
1946	.....	.....	.....	.....	.....	.....	.....	.....	24,036 779	.....
1947	24,036,779	.....	.....	2,211,377	504,731	2,716,108	2,011,227	+ 704,881	24,741,660	12.3
1948	24,741.660	.....	.....	3,804,600	461,164	4,265,764	2,186,197	+2,079,567	26,821,227	12.3
1949	26,821,227	.....	.....	2,591,639	982,982	3,574,621	2,017,347	+1,557,274	28.378 501	14.1
1950	28,378,501	.....	.....	2,705,648	623,099	3,328,747	2,171,187	+1,157,560	29,536,061	13.6
§1951	29,536,061	.....	.....	.....	.....	3,819,591	2,469,405	+1,350.186	30,886 247	12.5
1952 Est.	30,886,247	.....	.....	.....	.....	3,800,000	2,554,000	+1,246,000	32,132,247	12.6

* Production for 1936 and previous years from U. S. Bureau of Mines: production for 1937 and each subsequent year compiled by API (and AGA) committees on basis of 11 months actual and December estimated. Small variance of these figures from actual production as later reported is compensated by revision when reserves report for succeeding year is compiled.

† During years 1857-1899. ‡ Based on production of 57,071 thousand barrels in 1899. § Estimated by WORLD OIL. ‡ Crude oil only, not including 30,375 lease condensate fed into pipe lines with crude oil. * Includes 205,501 plant production of natural gasoline, etc; 30,375 lease condensate; estimated 19,500 losses and waste.

. . . to cut costs the Petroleum Industry has switched to *Electric Power*

Pipe line operators discovered many years ago that Electric Power was the answer to lower power cost. Regardless of the job to be done in moving fluid, Electric Power usually can do it more satisfactorily — *and for less.* Above is shown an application by a major oil company near Antioch, Oklahoma, utilizing 1-200 H.P. and 1-75 H.P. and several smaller pump motors for pumping crude oil. Electric Power is also used for tank gauging. Your power problems can be simplified, too, by using Electric Power. Let us PROVE IT TO YOU — now.

Petroleum Electric Power Association

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS
OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

New Production Methods

Promote Efficiency Despite Shortages

By J. L. HOYT, JR.
General Superintendent, Pan American Production Company, Houston

NEW TECHNIQUES in production have permitted the petroleum industry to lower costs, increase efficiency and conserve natural resources. This is the second of two articles devoted to new developments in the industry. This article is based on a paper presented at the February 5 meeting of the Houston Chapter, API, through whose permission it is published.

THE oil industry has become so dynamic and complex within the past decade that it is doubtful if any individual is able to keep up with all the advancements in equipment and techniques. A hurried review indicates that to discuss in detail all the new advancements in the production field alone would require a great deal of time. Hence, this discussion will be limited to a few new and practical production operations. These topics are far from revolutionary, but are presented here because they have wide application and because they demonstrate the ability of our industry to cope with new problems and to continually increase the efficiency of our operations.

First will be explained how one operator was able to case off successfully a deep well in West Texas without the necessary high grades and weights of pipe normally run as an integral string in the conventional manner. Today, all of us are faced continually with using casing designs which call for safety factors far below that formerly considered safe. This practice is due primarily to the serious shortages of high grade alloy steel. To give a better understanding of the reason for the casing design, to be described, a few facts will be pointed out about the well in which it was used. This well was projected to a depth of 13,000 feet with 13⅜-inch surface casing set at 300 feet and a 9⅝-inch intermediate string set at approximately 4600 feet. Drilling below 9⅝-inch casing in 7⅞-inch diameter hole proceeded without undue difficulty to approximately 10,650 feet. At this depth considerable difficulty was encountered with abnormal hole conditions. In short, it was one of those cases where it was practically impossible to maintain the necessary mud balance to overcome abnormal pressure and to avoid losing returns. As is well known, loss of mud returns in some West Texas areas is not uncommon. This can be rather serious since quite often the hole cannot be filled even with fluids of densities as low as water. In this particular well, the abnormal pressure originated in an oil-bearing formation which complicated the problem more than had the abnormal pressure existed in a gaseous zone. When the well was commenced, the operator did not anticipate any abnormal pressures in this area but did understand that several thousand feet of extremely hard drilling through chert and lime sections would be necessary. Therefore, it was deemed practical to drill a 7⅞-inch diameter hole in order to minimize hole size and increase the drilling rate.

While exercising additional caution and using some special well control equipment, drilling continued to below 11,100 feet. At this depth it was deemed advisable to use protective casing because further drilling would have been extremely hazardous. Formations to be encountered were known to be cavernous and certainly would never withstand the density of fluid necessary to control the abnormal pressure.

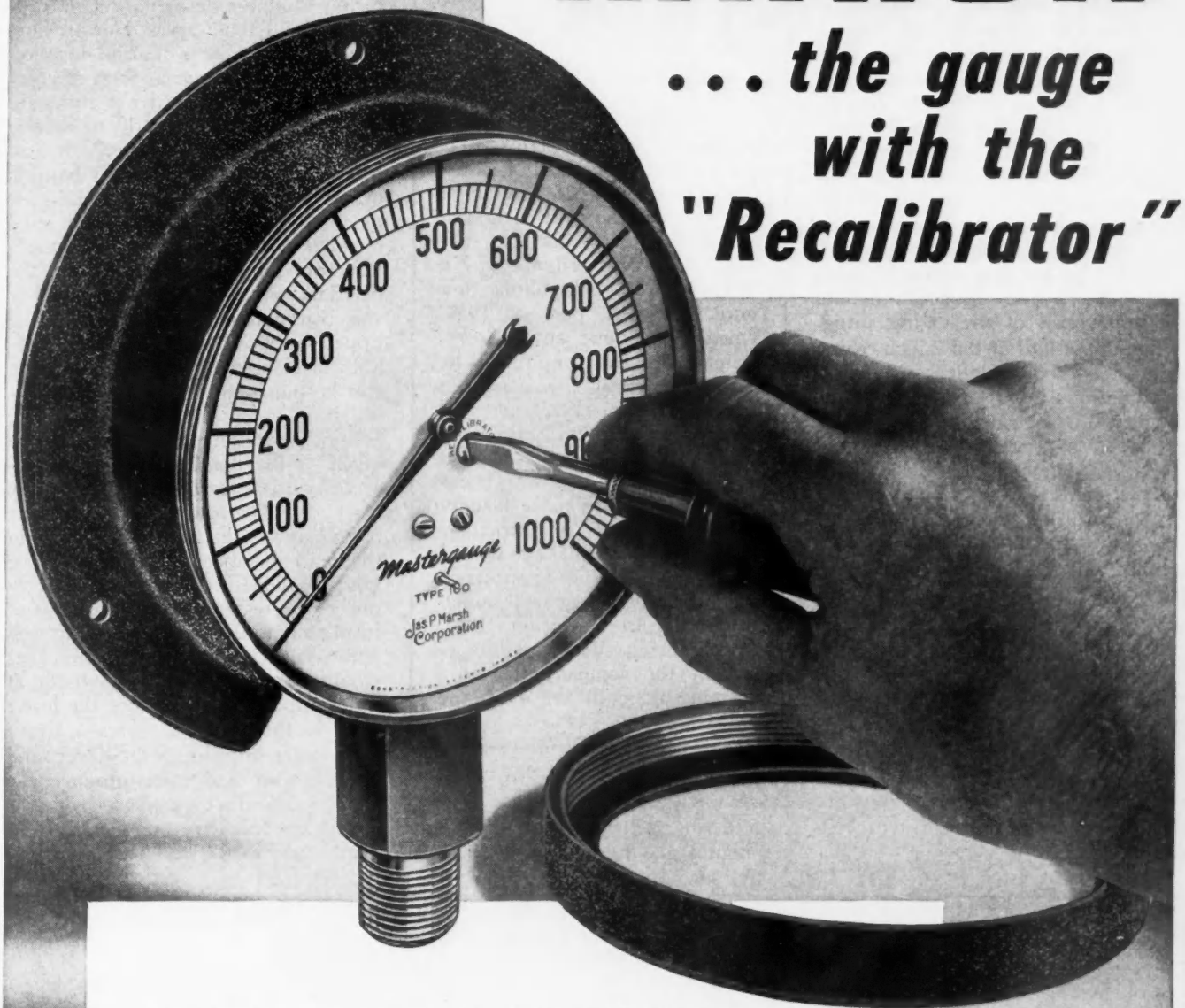
The decision to run protective casing left the operator faced with several problems. It was most essential to equip the well with the longest diameter casing which could safely be run in the 7⅞-inch diameter hole since 2000 feet of additional hole through extensive chert sections remained to be drilled. We know that bits under 6 inches in diameter are not practical for drilling chert. A caliper survey was made. It was found that the average diameter of the hole was approximately 8⅝-inch with a very few sections above 9 inches and several extremely hard streaks with a diameter of 7¾ inches. It was decided to equip the well with 7-inch outside diameter flush-joint casing in the open hole and run regular threaded and coupled 7-inch casing inside the 9⅝-inch.

Here the operator was faced with the problem of not having available the necessary weight and grade of 7-inch casing in order to provide a minimum factor of safety for the top of the string. In order to utilize available casing and cement the string on bottom in the minimum time, the casing string was designed and equipped to be run in two parts. The time required to run the casing was very important because it was impossible to maintain safely the necessary mud balance in preventing the abnormal pressure oil from feeding into the hole at the rate of approximately one barrel per hour while not circulating. Under these conditions of an exceedingly small annular volume as a result of using the maximum size casing in the hole, the need of getting the casing to bottom and satisfactorily cemented as quickly as possible was of paramount importance.

The lower section of the 7-inch casing string (Figure 1) was designed to extend from bottom to within a few hundred feet above the bottom of the 9⅝-inch casing. This string of 7-inch flush-joint casing was equipped with a fillup type float shoe and a landing float collar to facilitate running it in the small diameter hole. This equipment allowed displacement of fluid inside the pipe rather than on the outside to prevent filling the annulus with oil and possibly causing a blowout prior to cementing the

MARSH

. . . the gauge with the "Recalibrator"



Any pressure gauge can be knocked out of adjustment, but when it's a Marsh Gauge you can quickly correct it with the twist of the "Recalibrator" screw.

This is not only the handiest way to correct a gauge; it is also the best way. Conventional methods of adjustment simply compensate for the error. The "Recalibrator" corrects the relationship between the movement and the bourdon tube—actually *does re-calibrate* the gauge.

MARSH INSTRUMENT CO.

Sales Affiliate of Jas. P. Marsh Corp.

Dept. K, Skokie, Ill. Export Dept., 155 E. 44th St., New York 17, N. Y.

Marsh products include a full line and range of gauges in pressure, compound, altitude, hydraulic, sprinkler, ammonia, retard, test and diaphragm types. Dial thermometers in rigid stem and remote reading types. Ask on your letterhead for new catalog just off the press.

casing. The top section of this casing was equipped with a special liner setting sleeve without a casing hanger. Due to the small annular clearance, a casing hanger was not deemed necessary. This lower section of 7-inch casing was run in with 4½-inch drill pipe to the total depth without difficulty in the minimum time with all special equipment functioning perfectly. The casing was satisfactorily cemented and the drill pipe backed off from the liner sleeve.

However, as a special precautionary measure in the event that the cement failed to shut off the abnormal pressure zone, a specially constructed 8¼-inch O.D. packer was run on the drill pipe and made up in the top of the casing liner sleeve. It was collapsed against the wall of the 9⅝-inch casing. This packer was equipped with the necessary joint to accommodate the upper half of the casing string.

The upper half of the 7-inch casing string was about eight tons lighter than required by safe practices had it been run as an integral string. The upper string was then run and screwed into the joint above the packer, thus completing the string.

After waiting on cement for the conventional period, the casing was nippled up and tested with 2000 pounds for 30 minutes without any loss of pressure. Subsequently, the well was drilled to 13,100 feet in about 90 days without any difficulty whatsoever with the casing. As a matter of fact, most of the section was cored with a diamond bit since it was proved the most feasible. Actually, all of this 90-day period was not for drilling, since many drill-stem tests were taken.

About the Author

J. L. HOYT, JR., was graduated from Louisiana State University in 1938 with a B.S. degree in petroleum engineering. He joined Pan American Production Company as a roustabout in the Valentine field of Louisiana just a few years after the company was formed. He worked on a well-pulling unit until the early part of 1939, when he became an engineer-trainee. In this capacity he gained practical experience in many fields in Louisiana and Texas, and in mid-1941 was made a production foreman at Port Barre, La. He was transferred to the Willamar field of Southwest Texas as district superintendent in 1945, and moved to the Houston headquarters in 1948 as assistant general superintendent. In December, 1951, he became general superintendent of the company. He is a member of both the API and AIME.

Future application of this type casing design appears to be of value considering the present-day shortages of high grade tubular goods. This is another example of the industry handling a rather difficult problem in a completely satisfactory manner. Too, the actual additional cost over and above that for a conventional casing design was not too great.

We are all cognizant of the relatively high operating costs in water areas. Therefore, it is of prime importance to use every conceivable means to eliminate or curtail reworking wells in these areas. Here is how one operation in a marine location used a rather unique method of completing a gas well in order to eliminate the possibility of an early workover.

As can be seen in Figure 2, the gas producing zone of this well consists of multiple sand members separated by shale sections. In the bottom sand member there is a gas-water contact. But core analysis indicated that the distillate content of this sand member was considerably higher than in the upper sands. Therefore, it was desirable to complete the well initially in this bottom sand. However, this having been a wildcat in a water area, consideration certainly had to be given to the possible recoverable reserve versus the cost of an early workover. Of course, the easy way out would have been to complete in the sand member immediately above with the shale break possibly preventing early water encroachment. But from structural interpretation this well appeared to be one of the highest that would be drilled and this made it more important to produce the lower sand in this well.

In order to produce the lower sand to depletion and later produce the zone immediately above (or vice versa) the following completion technique was used. The well was per-

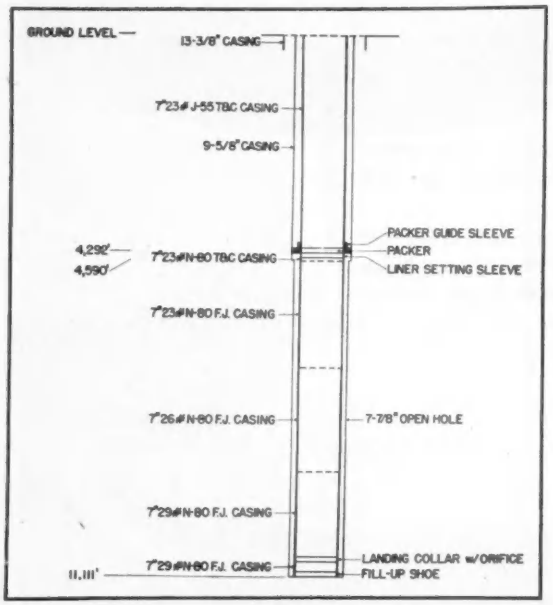


FIGURE 1

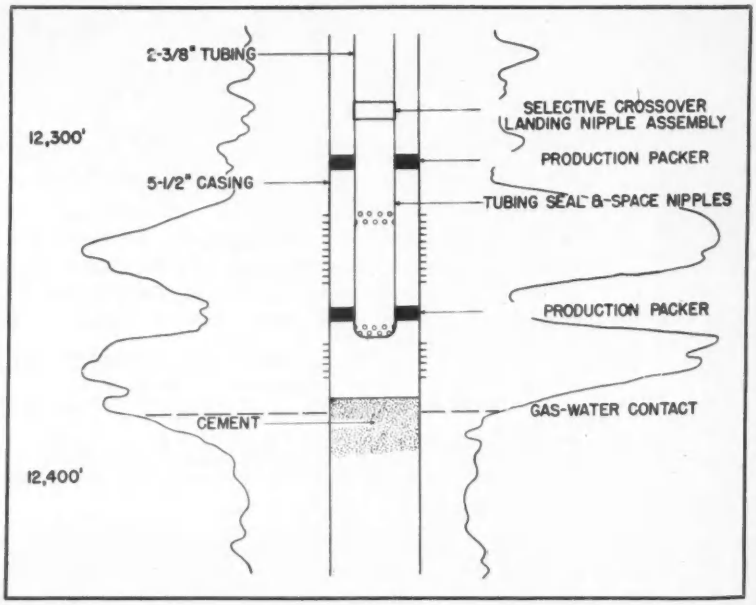


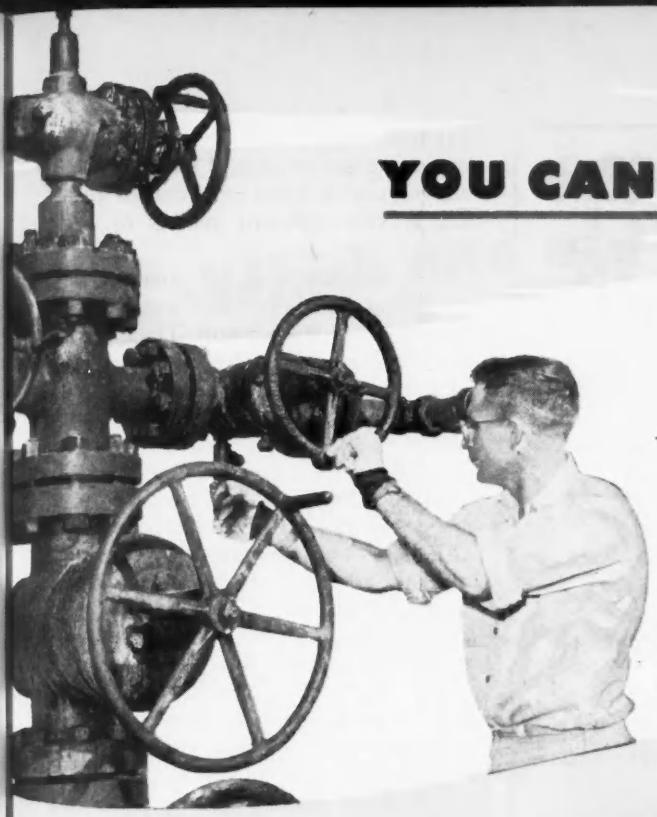
FIGURE 2

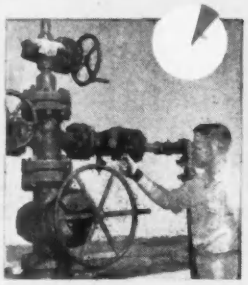
YOU CAN COMPLETELY OVERHAUL

A W-K-M VALVE

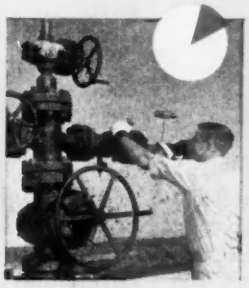
RIGHT ON THE TREE

IN ONE HOUR!

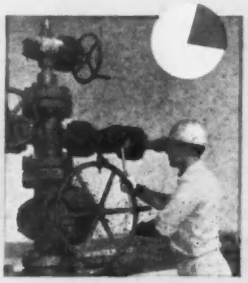




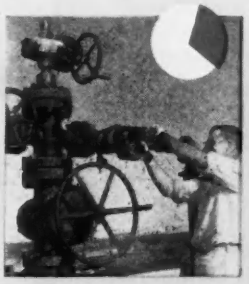
1&2 Bleeding pressure out of valve (top) and out of packing gland (above).



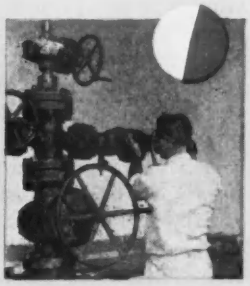
3 Removing bonnet clamp ring.



4 Removing bonnet seal ring.

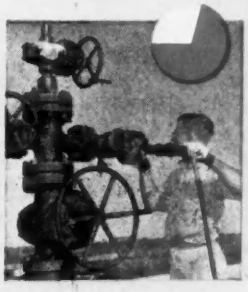


5 Removing bonnet, gate and segment.



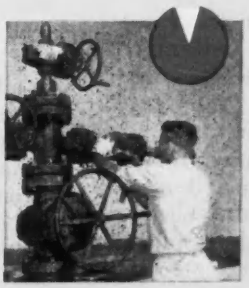
6 Breaking seats loose.

7 Removing worn seats.



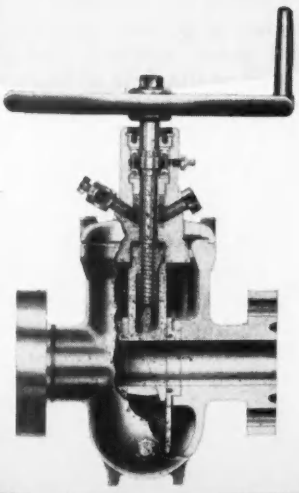
8 Installing new seats.

9 Installing new gate and segment.



10 Replacing stem, bonnet and bonnet seal ring.

11 Replacing clamp ring and the job is done. Elapsed time: one hour.



● The above photographs illustrate how simple it is to overhaul a W-K-M Valve on the tree. When overhauled as shown, the valve becomes as good as new, ready for many more years of efficient trouble-free service.

There is no need to go into great detail to point out the advantages and economies of on-the-spot repair—it is self evident that even the least valve on a tree can raise hob with production if it cannot be repaired or replaced in the shortest possible time.

Long run performance is far more important than first cost. When you buy, specify W-K-M—and you will be sure of satisfactory operation for the life of your tree.

W-K-M *Valves*

W-K-M COMPANY • P. O. BOX 2117 • HOUSTON 1, TEXAS

727 W. Seventh Street, Los Angeles, Calif. • Export Office, 30 Rockefeller Plaza, New York, N. Y.

forated below the water level and block squeezed. Then the two zones were perforated as indicated on the sketch. Drillstem tests were satisfactory and two wire line production packers were set above and below the upper group of perforations. The tubing string was then run with the necessary production packer seal and space nipples. A selective cross-over landing nipple with the outside ports plugged was spaced immediately above the upper production packer to accommodate the flow tube and chokes so that both zones could be produced selectively or simultaneously. Since this operation requires only the need of wire line servicing equipment, the cost of changing the producing zone will be relatively inexpensive. Several advantages are offered with this type of completion. In the event that the lower sand experiences early water encroachment, a workover can be postponed. Should a larger capacity well be needed, both zones can be produced simultaneously. Both zones can be produced through the tubing, leaving mud in the casing annulus to prevent corrosion. Permanent type production packers were used in order that the tubing string can be pulled without difficulty whenever a workover is required. In many instances when the permanent type production packer is used in a well with multiple sand members as indicated here, they can be left without any need for drilling at a subsequent date since the well may be plugged back to a higher sand member. This method of completion should find application in many areas.

Plastics have been used for sand consolidation with some degree of success for several years. A newly developed technique for the application of plastic eliminates the need of a workover rig, and is less likely to damage the producing formation or allow the plastic to flash set in the tubing. This technique is applied as follows: First the well is allowed to produce sufficiently to remove all mud and water from the formation. The well is then killed by pumping oil through the tubing into the formation. As shown in Figure 3, trucks are used. One truck is connected to the casing annulus in order to apply pressure above the production packer. The second is hooked directly to the tubing. Therefore, in the event one truck fails, a standby is ready to prevent leaving the plastic in the tubing. Approximately five barrels of mud acid are spotted in the tubing and slowly displaced with suffiicient oil to force it through the perforations. Ample time is allowed for the mud acid to

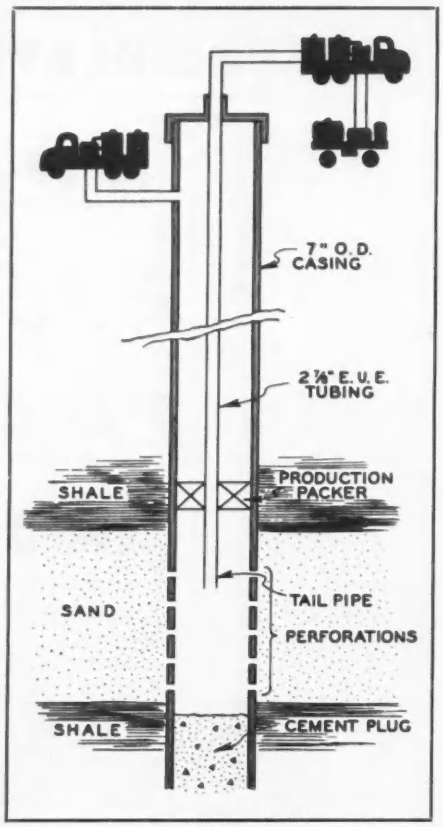


FIGURE 3

react with the mud cake and clays, thus cleaning the formation. The plastic and catalyst are then mixed and spotted in the tubing, again followed with oil for displacing through the perforations. After all the plastic has been displaced to the formation, the well is shut in for about eight hours to allow the plastic to reach the consolidation set. The plastic then is in a rigid mass and the formation containing it has low permeability. A second stage of plastic is then applied as above without the use of mud acid ahead. Upon completion of the second stage the well is shut in for 24 hours. Then the well is opened slowly for several hours to avoid creating a sudden pressure differential across the newly consolidated sand. After stabilizing, the well can be produced as consistent with good production practice.

Certainly this technique will be of no little value in controlling troublesome sand in many areas, but more especially in some of our deeper wells located in water areas where the cost of rigs and allied equipment is great. This technique also should be ideal for high pressure gas wells that produce small but troublesome quantities of sand that can damage regulating equipment.

A unique method of gas lifting has been used for several years with considerable success under certain well conditions. With some modifications that have been made during the past year this practice should lend itself to many types of wells in order to provide a very efficient means of gas lifting.

It is believed that this method of gas lifting has been used extensively only in one major South Texas field which happened to have ideal conditions for its application. This particular field produces from a pay zone composed of multiple sand members with an over-all average thickness of approximately 80 feet and is found at a depth of approximately 7900 feet. All these sand members are badly broken and have relatively low permeability. There is also a wide variation in the permeability of the several sand members, the top member ordinarily having the better permeability. A great many of these wells failed to have sufficient permeability in any one sand member to produce the field allowable at the time of development. This was especially true for the lower members. Consequently, the field was developed with most of the wells completed with all the multiple sand members perforated. At the time of development a relatively small gas cap was known to exist and as a result almost all completions were made with the uppermost perforations several feet below the original gas-oil contact. During development, the recovery mechanism had not been established, but soon thereafter the reservoir was discovered to be operating principally under a dissolved gas drive. The gas cap gradually expanded and the original gas-oil contact moved downward below the uppermost perforations, causing many wells to produce with high gas-oil ratios.

Fortunately, these high ratio wells were remedied by merely recompleting with a production packer set between two sets of perforations. Surprisingly, more than 90 percent of these blanking jobs were successful without squeezing, indicating that the primary cement jobs were very satisfactory.

Figure 4 shows the several sections perforated for original completion, the original gas-oil contact, and the gas-oil contact at the time of blanking off with the production packer. As mentioned previously, many of the lower sand members had extremely low permeability, and since the reservoir pressure had declined appreciably, many of these wells had insufficient productivity in the sand members below the packer to afford a natural flowing well that would produce the field well allowable.

Gas lifting or pumping 8000-foot

Which one of these valves will solve your problem?

If you need a production valve to handle extremely high pressures, or corrosive fluids, or distillates, McEvoy makes a valve for you! McEvoy Valves first became known because they could handle the "tough jobs".

If you need a low-pressure, low-cost valve that will give long, dependable service, one of the valves shown here will answer your requirements.

All McEvoy Valves have the same exclusive features that mean easy operation, positive sealing, and long life. Write for full information.

Now IMMEDIATE DELIVERY on McEvoy Valves!

Greatly increased production facilities have made it possible for us to keep pace with the soaring demand for McEvoy Valves. As a result, we can offer immediate delivery on many orders and delivery within a very short time on *any* order. Ask us for delivery quotations on your valve requirements.

3261

McEvoy COMPANY

TEXAS AND MILBY ST.
P. O. BOX 3127
HOUSTON 1, TEXAS

EXPORT REPRESENTATIVE: E. F. GAHAN, INC., ROOM 1223, 500 FIFTH AVENUE, NEW YORK, N. Y.

wells in the conventional manner requires a relatively expensive initial cost for installation; and secondly, the lifting cost for the remaining life of the well will be relatively high.

Note in Figure 4 that side door choke nipple was installed in the tubing string several joints above the control head packer. After reworking, the perforated zones above and below the production packer were cleaned simultaneously. Subsequently side door choke with a two or 3/64-inch perforation was installed. This installation permitted the lower zone below the packer to be gas lifted with gas from the upper zone. In reality this was nothing more than jetting, which has been done often with perforations in the tubing string. However, this installation offers a distinct advantage since it can be changed if found necessary for a relatively small expenditure using only wire line tools instead of a rig.

As a result of some of these installations many high gas-oil ratio wells which formerly produced with ratios ranging from 3000 to 15,000/1 were produced with a ratio of less than 2000/1, thereby returning to a maximum well allowable status. Of course, this method of gas lifting was more applicable to some wells than others, depending on the individual well conditions. In many cases the gas-oil ratio could not be reduced below 3000/1. But even this was considered more economical than resorting to one of the conventional types of gas lift or pumping, or continue producing at a curtailed rate due to high gas-oil ratio.

Today, this particular field is operating under pressure maintenance, and as the gas cap continues to expand this type of gas lift will be applicable to many more wells, especially since the gas will be compressed and returned to the reservoir.

Strictly speaking, this is not a very efficient means of gas lifting, but it is feasible under certain conditions.

As mentioned before, this technique has been modified during the past year. A pressure-controlled flow valve has been developed which can be run on a wire line and set in the choke nipple replacing the choke with the perforation. The wire line flow valve has the distinct advantage of being able to control the quantity of gas used for lifting. Of course, with the flow valve operating under relatively high pressure differentials, some mechanical difficulty can be expected. However, most any mechanical difficulty can be remedied with a minimum of expense, since only wire line tools will be needed for pulling and rerunning the valve. Several of these valves have been used with a high degree of success. The only difficulty experienced thus far has been with the fluid ports plugging, but modifications are now being made to eliminate this.

This type of gas lift may be applicable in many areas in the future for different types of wells. The main advantage offered by this type of gas lift is the low initial cost of installation and the relatively simple means of installing and checking for necessary repairs without the need of pulling tubing.

In the past, directional drilling has been used largely for reaching inaccessible locations, sidetracking junked holes, and obtaining favorable structural position. Directional drilling with some major modifications and new techniques is being used also to increase the productivity of wells producing from highly-fractured, low-permeability formations. The need of having the maximum amount of a low permeability formation exposed to the bore hole of a given well in order to obtain the greatest productivity is well recognized. This is especially true of formations with extensive vertical fracturing; consequently, several new techniques of directional drilling are now being used in an attempt to achieve this result.

The simplest method used is nothing more than ordinary directional drilling with much higher angles of deflection than were formerly considered practical. Another technique uses a turbine bit and flexible drilling string to drill lateral drain holes from a vertical bore hole. One other technique uses a specially designed whipstock and flexible drilling string to drill several lateral drain holes into the pay zone from the original bore hole. In other words, all these new techniques attempt to expose more formation to the bore hole by drilling through the formation at an angle. Any of these methods may expose two to four times as much pay zone to the bore hole compared with the ordinary vertical bore hole.

These new techniques and methods of directional drilling are more or less in the experimental stage and little is known of the degree of success to date. But it is understood that some of the results are most promising.

Certainly these new techniques should have widespread application, especially in areas like the Spraberry of West Texas. Also, many of our older fields that are producing from highly fractured low permeability formations may lend themselves to these techniques.

All these techniques and methods are only a small part of what is being done every day to continually improve oil-producing efficiency.

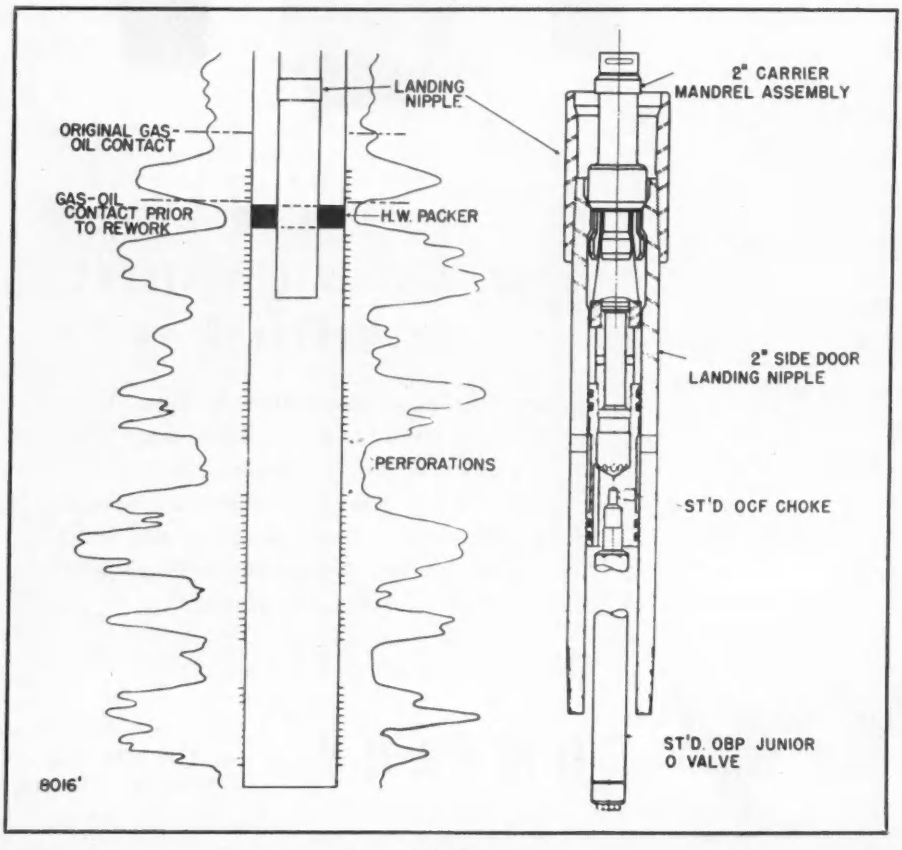


FIGURE 4

Minimum Hoisting Times

obtained by AUTOMATIC STEPLESS adjustment of line speed to load, realised by the HYDRAULIC TORQUE CONVERTER arranged between engine and drum in the

Wülfel-

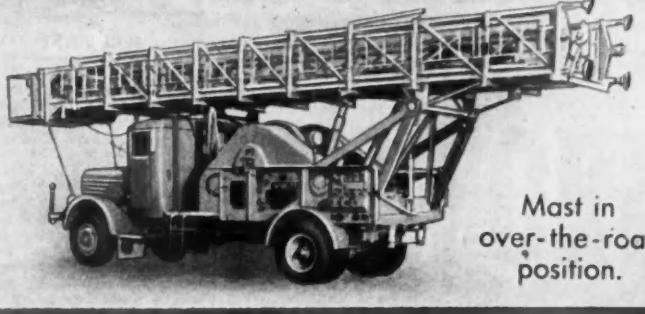
Truck-Mounted Hoist with Mast.

Power for all drives derived from 105- H. P. truck Diesel. Drum fitted with friction clutch on either side- one for high gear, one for low gear.

Trellis-work mast for either 40 or 60 tons crown load, 59 ft. working height. Easy raising and lowering as well as extending and telescoping of mast by hydraulic rams.

Air-operated drum clutches and hoist brake. Clutch-mounted sprockets provide possibility for driving rotary table and mud pump.

Operating position quite close to hole affords optimum visibility.



Mast in over-the-road position.

Please write for detailed information.

EISENWERK WUELFEL • HANNOVER-WUELFEL • GERMANY

See Wuelfel at the German Industries Fair, Hanover, from April 27th to May 6th, 1952. Open-Air Space.

Producing Depth Records

Toppled in 12 Areas

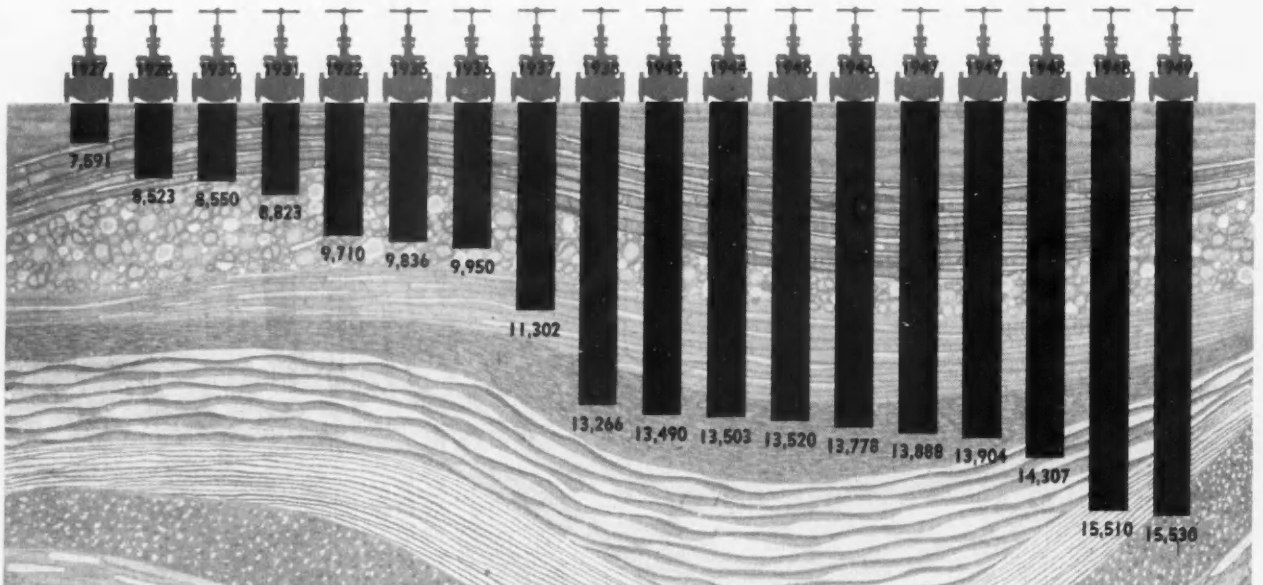
TWELVE area producing depth records were topped in 1951, but the world mark withstood a potent threat from a South Louisiana well.

It was by the thin margin of 194 feet that Standard Oil Company of California's Mushrush 5, Kern County, California, an oiler completed in 1949, retained its deepest producing distinction over the Louisiana oil well. The latter was Shell Oil Company's H. T. Gonsoulin 1, Weeks Island field, Iberia Parish, completed in the Miocene formation at 15,336 feet.

H. T. Gonsoulin 1 lifted the area mark from another Shell well completed in the same field and from the same formation in 1950.

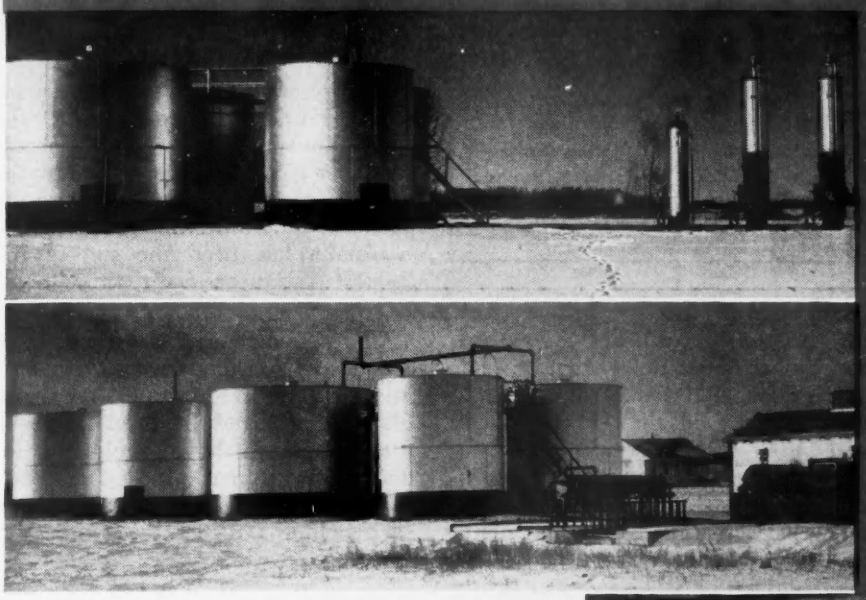
Two of the new records marked first production in their respective states. These were Amerada Petroleum Corporation's Clarence Iverson 1, Williams County, North Dakota, which set off widespread activity in the Williston Basin by producing oil from 8528 feet; and Tom Hawksworth Oil & Gas Development Company's Hawksworth State 4, Grays Harbor County, Washington, an oiler at 3714 feet.

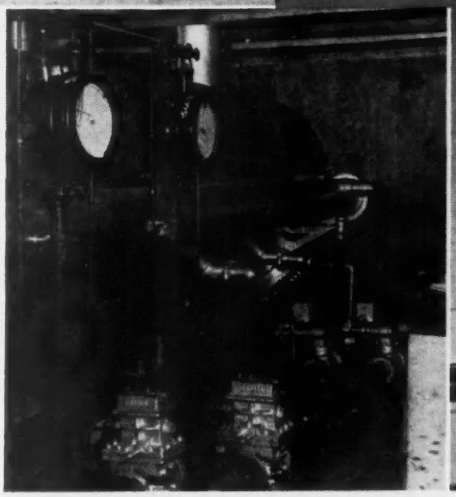
Of all the new area marks, only three besides the Louisiana well ex-

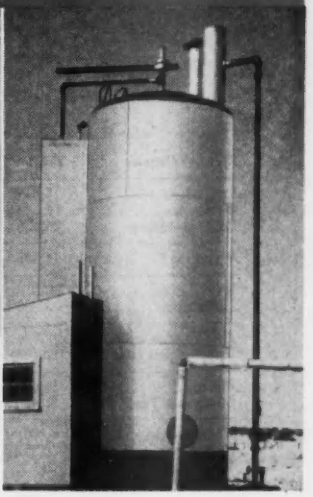


Year	WELL AND LOCATION	Feet
1927	E. J. Miley's Athens 6, Rosecrans field, California	7,591
1928	Texon Oil and Land Company's University 1-B, Big Lake field, West Texas	8,523
1930	Star Petroleum Company's Colby 2, Long Beach, California	8,550
1931	Tide Water Associated Oil Company's Lloyd 57, Ventura Avenue, California	8,823
1932	Tide Water Associated Oil Company's Lloyd 83, Ventura Avenue, California	9,710
1935	Tide Water Associated Oil Company's Lloyd 131, Ventura Avenue, California	9,836
1936	The Texas Company's Lafitte 5, Lafitte field, Southern Louisiana	9,950
1937	Union Oil Company's Kernco 1-34, Rio Bravo field, Kern County, California	11,302
1938	Fohs Oil Company's Buckley-Bourg 1, DeLarge field, Southern Louisiana	13,266
1943	Union Producing Company's Fitzpatrich-Vizard 1, DeLarge field, Southern Louisiana	13,490
1944	Union Producing Company-Fohs Oil Co.'s Buckley-Bourg 2, DeLarge field, Southern Louisiana	13,503
1945	Shell Oil Company's Smith-State 1, Weeks Island field, Southern Louisiana	13,520
1946	Shell Oil Company's Smith-State 2, Weeks Island field, Southern Louisiana	13,778
1947	Shell Oil Company's Smith-State 3, Weeks Island field, Southern Louisiana	13,888
1947	The Texas Company's LaFourche Basin Levee Dist. 1, Queen Bess Island field, Southern Louisiana	13,904
1948	Pure Oil Company's Unit 1, West Poison Spider field, Wyoming	14,307
1948	Denver Producing and Refining Company's School Land 1-A, Cogar field, Caddo County, Oklahoma	15,510
1949	Standard Oil Company of California's Mushrush 5, Wasco field, Kern County, California	15,530

MALONEY-CRAWFORD TANKS, SEPARATORS, TREATERS, STAND UP UNDER WINTER CONDITIONS in CANADA







Severe winters require the best of equipment in addition to proper coverings and operation techniques.

Maloney-Crawford tanks, separators, and emulsion treaters have demonstrated they are capable of withstanding the extreme temperatures in Western Canada, which range from 40 to 60 degrees below, as well as in other cold weather localities.

Pictured in this ad are Maloney-Crawford tanks, separators, and treaters in Western Canada. Note the part shelter on the unit, at right, which encloses piping and gages; and the inside view of a shelter, at left, completely enclosing separator and other lease equipment affected by the cold.

Maloney-Crawford engineers are available to discuss winter problems with you and to suggest applications to fit your needs.

Call a Maloney-Crawford representative at any Stock and Service Center.

STOCKS AND SERVICE AT THESE PRINCIPAL OIL CENTERS

Artesia, N. M.; Corpus Christi, Tex.; Dallas, Tex.; Edmonton, Canada; Farmington, N. M.; Fort Worth, Tex.; Houston, Tex.; Lafayette, La.; Midland, Tex.; New Orleans, La.; Odessa, Tex.; Oklahoma City, Okla.; Pampa, Tex.; San Angelo, Tex.; Snyder, Tex.; Tulsa, Okla.; Wichita Falls, Tex.

MALONEY CRAWFORD

MALONEY-CRAWFORD TANK & MFG. CO.

FACTORY AND GENERAL OFFICE: 38 NORTH PEORIA—Box 659—TULSA, OKLAHOMA
EXPORT REPRESENTATIVE: Baird Lines, 420 Lexington Avenue, New York, N. Y.
CANADIAN REPRESENTATIVE: Maloney-Crawford of Canada, Ltd., Edmonton, Canada
TEXAS PANHANDLE REPRESENTATIVE: H. W. Waddell, Pampa, Texas

ceeded 10,000 feet. In New Mexico, Phillips Petroleum Company and The Atlantic Refining Company's Denton 3-A, Denton field, Lea County, was a producer from 12,766 feet to displace a record set in 1949. On the Upper Texas Coast, Meredith, Clegg and Hunt's Weisse 1, Jefferson County, went to 12,725 feet to erase the year-old record set by the same operators in the same county. In Southwest Texas, Western Natural Gas Company's St. Charles Ranch Company 14, Aransas County, was a producer at 11,490 feet to replace a mark set a year earlier in the same county.

Other Records

The other 1951 area records were as follows: Arkansas, 9335 feet; Montana, 9079; Nebraska, 7354; Kansas, 6536; Alabama, 5425; and Michigan, 5238.

Although it was only 15 years ago that production was first tapped below 10,000 feet, no wells in the 10,000-foot class are now among the ten deepest producers. The three deepest are in the 15,000-foot bracket; one is in the 14,000-foot division, and two each are in the 13,000, 12,000 and 11,000-foot classes.

Indicative of the trend to deep production is that none of the ten deepest wells were drilled more than five years ago. Likewise, 26 of the 39 area marks have been made in the last five years and 14 have been set in the last two years.

Of the 39 area records, the mark of 1444 feet established in Missouri in 1940 is the shallowest. Oldest record is Kentucky's 5170 feet, made in 1932.

State Leader

Failure of the Shell's Weeks Island area record-holder to displace the California well as the world's deepest producer gave the latter state the distinction of having had the deepest producer nine times since 1927. South Louisiana has been the site of the deepest producer eight times since 1927.

The unchanged record also pushed Standard Oil Company of California into a tie with Tide Water Associated Oil Company and Shell Oil Company for the honor of having held the producing depth mark most frequently since 1927. These companies have each held the record three times.

Order Your Copy of 1951 World Oil Index

The complete editorial index covering all issues of WORLD OIL published during 1951 has been prepared and is bound separately in convenient pamphlet form. It will be sent free to all subscribers who write requesting copies.

Orders should be addressed immediately to the Circulation Department, Box 2608, Houston 1, Texas, as quantities are limited.

Producing Depth Records in U. S., by States and Districts

State or District	Feet*	Year	Formation	Well, Location, and Type of Production
California	15,530	1949	Eocene	Standard Oil Co. of California's Mushrush 5, Wasco field, Kern County. (Oil) World's Deepest
Oklahoma	15,510	1948	Viola	Denver Producing & Refining Company's School Land 1-A, Cogar field, Caddo County. (Gas)
South Louisiana	15,336	1951	Miocene	Shell Oil Company's H. T. Gonsoulin 1, Weeks Island field, Iberia Parish. (Oil)
Wyoming	14,307	1948	2nd Frontier	Pure Oil Company's Unit 1, West Poison Spider field, Natrona County. (Oil)
West Texas	13,310	1950	Ellenburger	General American Oil Co.'s J. F. Peck 3-E, Sweetie Peck field, Midland County. (Oil)
Mississippi	13,082	1947	Glen Rose	Gulf Refining Company's L. L. Majors 1, West Ovett field, Jones County. (Oil)
New Mexico—S.E.	12,766	1951	.....	Phillips Petroleum Co. and Atlantic Refining Co.'s Denton 3-A, Denton field, Lea County. (Oil)
Upper Texas Coast	12,725	1951	Frio	Meredith, Clegg and Hunt's Weisse 1, Jefferson County. (Condensate)
Florida	11,588	1948	L. Cretaceous	Humble O&R Co.'s Lee Tidewater Cypress Lumber Co. 1-B. Suniland field, Collier County. (Oil)
Southwest Texas	11,490	1951	Frio	Western Natural Gas Co.'s St. Charles Ranch Co. 14, Blackjack field, Aransas County. (Gas)
North Louisiana	10,864	1949	Smackover "B"	Midstates Oil Corp.'s Lewis-Hearn-Williamson 1, Haynesville Deep field, Claiborne Parish. (Oil)
East Texas	10,312	1942	Pettit	Humble Oil & Refining Company's Curtis 1, Larissa field, Cherokee county. (Oil)
Lower Texas Coast	10,132	1946	Wilcox	Continental Oil Company's Clay-West Burns 2, Clay West field, Live Oak County. (Oil)
Colorado	9,435	1950	Paradox	Delhi Oil Corporation's Barker 5, Barker Dome field, La Plata County. (Gas)
Utah	9,392	1949	Basal Tertiary	Carter Oil Co. & Stanolind O&G Co.'s Ute Tribal 1, Roosevelt field, Uintah County. (Oil)
Arkansas	9,335	1951	Smackover	Carter Oil Company's Bodcaw Lumber Co. 11, McKamie field, Lafayette County. (Oil)
Montana	9,079	1951	Devonian	The Texas Company's Northern Pacific RR 1, Dawson County. (Oil)
South Central Texas	9,018	1946	Edwards	Quintana Petroleum Corporation's C. Muil 3, Muil field, Atascosa County. (Oil)
Texas Panhandle	8,970	1949	Mississippian	Sinclair Oil & Gas Company's C. S. Lips 1, Lips field, Roberts County. (Oil)
North Texas	8,940	1946	Ellenburger	Standard Oil of Texas' I. Beasely 2, Sivels Bend field, Cooke County. (Oil)
New Mexico—N.W.	8,875	1945	Paradox	Southern Union Gas Co.'s Barker-Ute Indian 11, Barker Creek field, San Juan County. (Gas)
North Dakota	8,528	1951	Madison	Amerada Petroleum Corp.'s Clarence Iverson 1, Beaver Lodge field, Williams County. (Oil)
West Virginia	8,410	1946	Oriskany	Ohio Oil Company's Kuykendall et al 1, Dry Fork District, Tucker County. (Gas)
Pennsylvania	8,229	1949	Onondaga	Peoples Natural Gas Co.'s William Piper 1, Unity Township, Westmoreland County. (Gas)
Nebraska	7,354	1951	Dakota "J"	Gulf Oil Company's Sisson 1, Sisson field, Kimball County. (Oil)
North Central Texas	7,132	1950	Ellenburger	Sun Oil Company's J. P. Maddox 1, Mary Neal field, Nolan County. (Oil)
Kansas	6,536	1951	Viola	Stanolind O&G Co.'s Daisy Wall 1, Ashland field, Clark County. (Oil)
Ohio	5,880	1946	Clinton	Frank Lyon's Anita B. Wright 1, Hanover Township, Columbiana County. (Gas)
Alabama	5,425	1951	.....	Humble O&R Co.'s Charles O. Oswell 1, Carlton, South field, Baldwin County. (Oil)
New York	5,229	1942	Oriskany	E. Kent Kane's Robert Lewis 1, West Union Township, Steuben County. (Gas)
Kentucky	5,170	1932	Devonian	United Carbon Company's Howe 1, Pike County. (Gas)
Michigan	5,238	1951	Richfield	E. V. Hilliard's State-Roscommon R. L. 1, Headquarters field, Roscommon County. (Oil)
Illinois	4,780	1943	Trenton	Kingwood Oil Company's Shanafelt 24-A, Salem field, Marion County. (Oil)
Maryland	4,456	1949	Huntersville	Cumberland & Allegheny Gas Company's Elmer N. Beachy S-424, Garrett County. (Gas)
Washington	3,714	1951	Kincaid	Tom Hawksworth & Oil & Gas Development Co.'s Hawksworth State 4, Grays Harbor County. (Oil)
Indiana	3,011	1946	McClosky	H. E. Ledbetter et al's Noble Utley 1, Springfield Consolidated field, Posey County. (Oil)
Tennessee	1,790	1948	Knox	Turner Bros. and Shaner's Fred Johnson 1, Forbus field, Fentress County. (Oil)
Missouri	1,444	1940	Bartlesville	Cities Service Oil Company's Jim Cook 1, Tarkio field, Atchison County. (Oil)

* Maximum depth from which production comes.

Perfection

70 YEARS

W.C. NORRIS, MANUFACTURER, INC.

TULSA, OKLAHOMA

WEST COAST DISTRIBUTORS:
REPUBLIC SUPPLY COMPANY OF CALIFORNIA,
Los Angeles

Since QUALITY PRODUCTS 1882

BRANCHES:
HOUSTON, KILGORE, ODESSA, TEXAS;
SALEM, ILLINOIS; CASPER, WYOMING

EXPORT: 30 ROCKEFELLER PLAZA, NEW YORK CITY

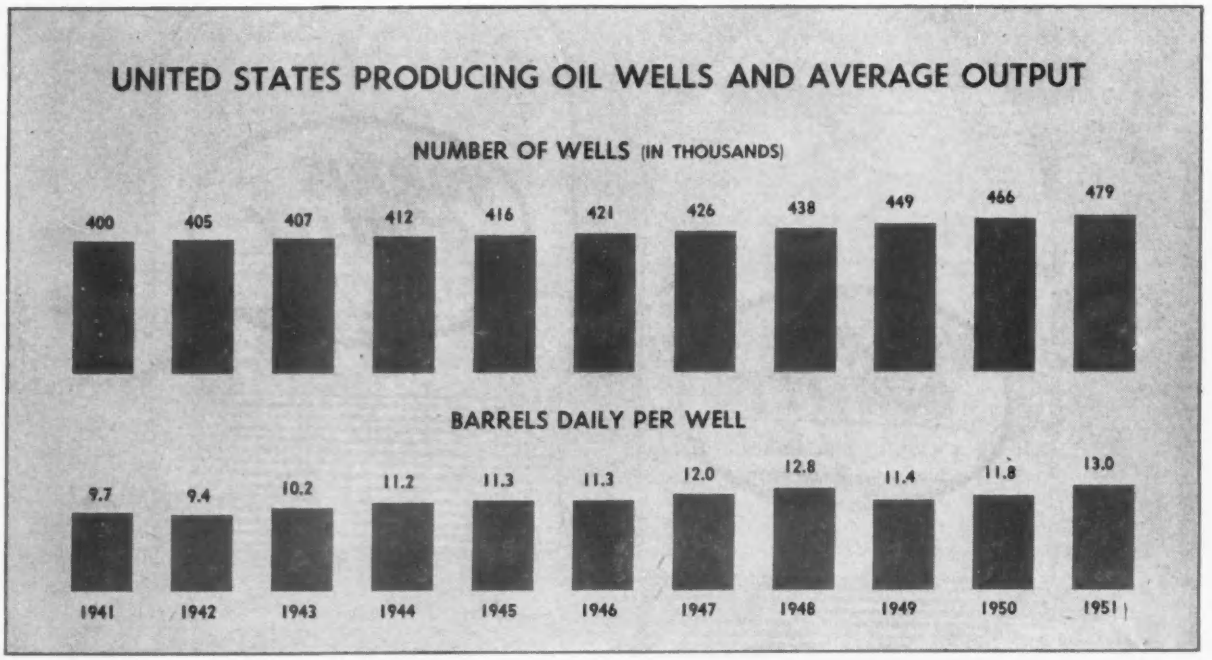
Producing Oil Wells

Hit History's Top Total

A TOTAL of 482,260 producing oil and condensate wells at the end of 1951 is the largest number in U. S. history. This is a gain of 12,787 wells over 1950 figures and represents an increase of 2.7 percent. Gain in producing oil wells for 1950 was 17,004. This is significant in that 1950 saw 23,775 new oil wells completed, compared to 23,179 new oil wells completed in 1951.

Of the increase in producing oil wells, 11,291 were artificial lift to bring the 1951 total artificial lift wells for the U. S. up to 423,547. The number of flowing wells continues to increase also. During 1951, were added 1496 new flowing wells to bring the total to 55,548.

One of the most significant facts in the production picture is that the average daily flow per well was at a greater volume during 1951 than in any previous year in U. S. oil history. This per well daily production average was 13 barrels compared to the previous all-time high of 12.8 set in 1948. This high per-well production was set at a time when average U. S. daily oil production exceeded 6 million barrels for the first time. The average daily production of oil in the U. S. for 1951 was 6,213,400 barrels.



YEAR	Number of Producing Oil Wells at End of Year	Gain In No. Producing Oil Wells	New Oil Wells Completed in Year	Production Per Well Per Day During Year	YEAR	Number of Producing Oil Wells At End of Year	Gain In No. Producing Oil Wells	New Oil Wells Completed in Year	Production Per Well Per Day During Year	YEAR	Number of Producing Oil Wells At End of Year	Gain In No. Producing Oil Wells	New Oil Wells Completed in Year	Production Per Well Per Day During Year
1918...	203,375	.....	17,860	....	1929..	328,200	400	15,362	8.4	1940..	389,010	8,620	19,843	9.6
1919...	227,000	23,625	21,041	4.8	1930..	331,070	2,870	11,693	7.5	1941..	399,960	10,950	19,590	9.7
1920...	251,000	24,000	24,278	5.0	1931..	315,850	*15,220	7,011	7.2	1942..	404,840	4,880	10,977	9.4
1921...	274,500	23,500	14,715	4.9	1932..	321,500	5,650	10,530	6.7	1943..	407,170	2,330	9,887	10.2
1922...	284,880	10,380	17,790	5.7	1933..	326,850	5,350	8,070	7.7	1944..	412,220	5,050	13,502	11.2
1923...	290,100	5,220	16,182	6.6	1934..	333,070	6,220	13,119	7.5	1945..	415,750	3,530	13,944	11.3
1924...	299,100	9,000	14,707	6.2	1935..	340,990	7,920	15,418	8.1	1946..	421,460	5,710	16,087	11.3
1925...	306,100	7,000	17,029	6.5	1936..	349,450	8,460	18,704	8.7	1947..	426,280	4,820	17,613	12.0
1926...	318,600	12,500	18,626	6.8	1937..	363,030	13,580	23,115	9.8	1948..	437,880	11,600	22,197	12.8
1927...	323,300	4,700	14,382	7.7	1938..	369,640	6,610	19,106	9.1	1949..	448,680	10,800	21,415	11.4
1928...	327,800	4,500	12,348	7.6	1939..	380,390	10,750	17,734	9.2	1950..	466,308	17,004	23,775	11.8
										1951..	479,095	12,787	23,179	13.0

* Only decrease of recent time, reflecting abandonment or shutting in of many wells when early chaotic development of East Texas field, coupled with business depression, severely depressed crude prices.

SOURCE: Producing well data for 1918-1948 from U. S. Bureau of Mines, with more recent years by WORLD OIL with cooperation of state conservation officials and others. Completion data since 1920 from records of WORLD OIL (and predecessor, The Oil Weekly), earlier years from Bureau of Mines. Daily average production per well obtained by dividing daily average production of nation for year by average number of wells producing during year, that is, between January 1 and December 31.

Active Producing Crude Oil and Condensate Wells in U. S., Methods of Producing, and Average Output Per Well, by States and Districts, at End of 1950 and 1951

Data represents only active crude oil and condensate producing wells, including no inactive or shut-in wells and no gas wells. Compiled by WORLD OIL, with cooperation of state conservation departments and other sources.

STATE or DISTRICT	CONDENSATE WELLS						CRUDE OIL WELLS										TOTAL CRUDE OIL AND CONDENSATE WELLS					
	End of 1950			End of 1951			Flowing		Artificial Lift		Total Crude Oil Wells						End of 1950			End of 1951		
		Bbls. Daily Production			Bbls. Daily Production						End of 1950			End of 1951			Bbls. Daily Production			Bbls. Daily Production		
	Wells	Total	Per Well	Wells	Total	Per Well	End of 1950	End of 1951	End of 1950	End of 1951	Wells	Total	Per Well	Wells	Total	Per Well	Wells	Total	Per Well	Wells	Total	Per Well
Alabama									58	75	58	2,700	46.6	75	2,800	37.3	58	2,700	46.6	75	2,800	37.3
Arkansas	46	4,400	95.7	77	5,350	69.5	361	312	3,266	3,329	3,627	78,300	21.6	3,641	77,100	21.2	3,673	82,700	22.5	3,718	82,450	22.2
California	89	2,750	30.9	53	2,450	46.2	2,143	1,934	25,963	27,656	28,105	955,150	34.0	29,590	985,100	33.3	28,195	958,900	34.0	29,643	987,550	33.3
San Joaquin Valley	89	2,750	30.9	53	2,450	46.2	1,348	1,060	13,740	14,642	15,088	419,250	27.8	15,702	424,600	27.0	15,177	422,000	27.8	15,755	427,050	27.1
Coastal District							515	618	3,179	3,519	3,694	188,100	50.9	4,137	216,700	52.4	3,694	188,100	50.9	4,137	216,700	52.4
Los Angeles Basin							280	256	9,044	9,495	9,324	348,800	37.4	9,751	343,800	35.3	9,324	348,800	37.4	9,751	343,800	35.3
Colorado							191	135	572	700	763	75,000	98.3	835	77,900	93.3	763	75,000	98.3	835	77,900	93.3
Florida							1	1	11	11	12	1,500	125.0	12	1,700	141.7	12	1,500	125.0	12	1,700	141.7
Illinois							16	12	33,113	32,873	33,129	162,900	4.9	32,885	170,750	5.2	33,129	162,900	4.9	32,885	170,750	5.2
Indiana							12	18	3,946	4,222	3,958	26,400	6.7	4,240	32,050	7.6	3,958	26,400	6.7	4,240	32,050	7.6
Kansas							73	45	30,093	31,215	30,166	301,600	10.0	31,260	315,350	10.1	30,166	301,600	10.0	31,260	315,350	10.1
Kentucky							5	36	15,260	15,524	15,265	29,100	1.9	15,560	34,850	2.2	15,265	29,100	1.9	15,560	34,850	2.2
Louisiana	815	25,250	31.0	1,057	36,400	34.4	3,477	3,417	7,667	8,106	11,144	582,850	52.3	11,523	602,950	52.3	11,959	608,100	50.8	12,580	639,350	50.8
North Louisiana	345	10,250	29.7	442	13,250	30.0	564	420	6,177	6,564	6,741	109,650	16.3	6,984	112,750	16.1	7,086	119,900	16.9	7,426	126,000	17.0
South Louisiana	470	15,000	31.9	615	23,150	37.6	2,913	2,997	1,490	1,542	4,403	473,200	107.5	4,539	490,200	108.0	4,873	488,200	100.2	5,154	513,350	99.6
Michigan							141	155	3,577	3,730	3,718	40,000	10.8	3,885	38,300	9.9	3,718	40,000	10.8	3,885	38,300	9.9
Mississippi	171	4,350	25.4	144	4,400		280	126	1,168	1,466	1,448	99,850	69.0	1,592	97,250	61.1	1,619	104,200	64.4	1,736	101,650	58.6
Missouri									46	43	46	67	1.5	43	100	2.3	46	67	1.5	43	100	2.3
Montana	6			11			20	22	3,086	3,188	3,106	23,800	7.7	3,210	25,050	7.8	3,112	23,800	7.6	3,221	25,050	7.8
Nebraska							35	27	107	181	142	8,000	56.3	208	7,550	36.3	142	8,000	56.3	208	7,550	36.3
New Mexico	45			49			3,232	3,283	2,597	2,768	5,829	135,900	23.3	6,051	147,450	24.4	5,874	135,900	23.1	6,100	147,450	24.2
Northwest N. M.	37			38					40	39	40	1,300	32.5	39	350	9.0	77	1,300	16.9	77	350	4.5
Southeast N. M.	8			11			3,232	3,283	2,557	2,729	5,789	134,600	23.3	6,012	147,100	24.5	5,797	134,600	23.2	6,023	147,100	24.4
New York									23,200	23,200	23,200	11,000	0.5	23,200	13,300	0.6	23,200	11,000	0.5	23,200	13,300	0.6
North Dakota								2						2	150	75.0				2	150	75.0
Ohio							50	50	19,750	19,650	19,800	8,000	0.4	19,700	7,350	0.4	19,800	8,000	0.4	19,700	7,350	0.4
Oklahoma							1,740	1,605	55,086	55,715	56,826	498,800	8.8	58,320	518,450	8.9	56,826	498,800	8.8	58,320	518,450	8.9
Pennsylvania									82,200	82,300	82,300	30,900	0.4	82,300	27,200	0.3	82,200	30,900	0.4	82,300	27,200	0.3
Tennessee									36	34	36	33	0.9	34	50	1.5	36	33	0.9	34	50	1.5
Texas*	1,584	39,900	25.2	1,753	43,150	24.6	41,949	44,051	81,322	86,216	123,271	2,370,700	19.2	130,267	2,751,950	21.1	124,855	2,410,600	19.3	132,020	2,795,100	21.2
Dist. 1: South Central	8	50	6.3	19	200	10.5	270	238	3,499	3,707	3,769	31,000	8.2	3,945	32,700	8.3	3,777	31,050	8.2	3,964	32,900	8.3
Dist. 2: Middle Gulf	299	2,850	9.5	326	3,250	10.0	3,209	3,162	1,230	1,428	4,439	141,700	31.9	4,590	163,050	35.5	4,738	144,550	30.5	4,916	166,300	33.8
Dist. 3: Upper Gulf	543	20,150	37.1	614	24,150	39.3	5,031	5,023	4,875	5,438	9,906	426,500	43.1	10,461	461,750	44.1	10,449	446,650	42.7	11,075	485,900	43.9
Dist. 4: L. Gulf-S.W.	227	3,250	14.3	240	4,550	19.0	4,490	4,926	5,825	5,982	10,315	218,900	21.2	10,908	251,700	23.1	10,542	222,150	21.0	11,148	256,250	23.0
Dist. 5: East Central	56	250	4.5	56	250	4.5	422	530	1,574	1,676	1,996	40,250	20.2	2,206	52,600	23.8	2,052	40,500	19.7	2,262	52,850	23.4
Dist. 6: E. Tex. Fld.							12,259	11,832	9,611	9,584	21,870	270,700	12.4	21,416	268,800	12.6	21,870	270,700	12.4	21,416	268,800	12.5
Dist. 6: Northeast	269	4,150	15.4	317	3,500	11.0	1,089	1,096	2,067	2,245	3,156	92,400	29.3	3,341	122,800	36.7	3,425	96,550	28.2	3,658	126,300	34.5
Dist. 7-B: N. Central	48	100	2.1	38	100	2.6	1,436	1,588	7,185	7,769	8,621	72,600	8.4	9,357	84,250	9.0	8,669	72,700	8.4	9,395	84,350	9.0
Dist. 7-C: W. Central	86	8,500	98.8	75	6,700	89.3	674	1,303	1,820	2,266	2,494	71,800	28.8	3,539	116,400	32.6	2,580	80,300	231.1	3,644	123,100	33.8
Dist. 8: West	30	500	16.7	36	350	9.7	11,827	12,936	15,467	17,535	27,294	778,150	28.5	30,471	953,400	31.4	27,324	778,650	28.5	30,507	956,750	31.4
Dist. 9: North	15	100	6.7	30	100	3.3	1,217	1,392	20,693	20,918	21,910	149,200	6.8	22,310	157,950	7.1	21,925	149,300	6.8	22,340	158,050	7.1
Dist. 10 Panhandle	3			2			25	25	7,476	7,668	7,501	90,000	12.0	7,693	83,550	10.9	7,504	90,000	12.0	7,695	83,550	10.9
Utah							3	4	30	38	33	3,700	112.1	42	3,350	79.8	33	3,700	112.1	42	3,350	79.8
Virginia									15	15	15	100	6.7	15	100	6.7	15	100	6.7	15	100	6.7
West Virginia									15,200	15,000	15,200	6,800	0.4	15,000	6,800	0.5	15,200	6,800	0.4	15,000	6,800	0.5
Wyoming	11	650	56.9	21	800	38.1	323	313	4,887	5,292	5,210	187,150	35.9	5,605	175,900	31.4	5,221	187,800	36.0	5,626	176,700	31.4
Total United States	2,767	77,300	27.9	3,165	92,550	29.2	54,052	55,548	412,256	423,547	466,308	5,641,300	12.1	479,095	6,120,850	12.7	469,075	5,718,600	12.2	482,260	6,213,400	12.8

* Texas production by districts from A.P.I. and different slightly from state total, which is from Bureau of Mines.

Refinery Operations

Accelerated by New Construction

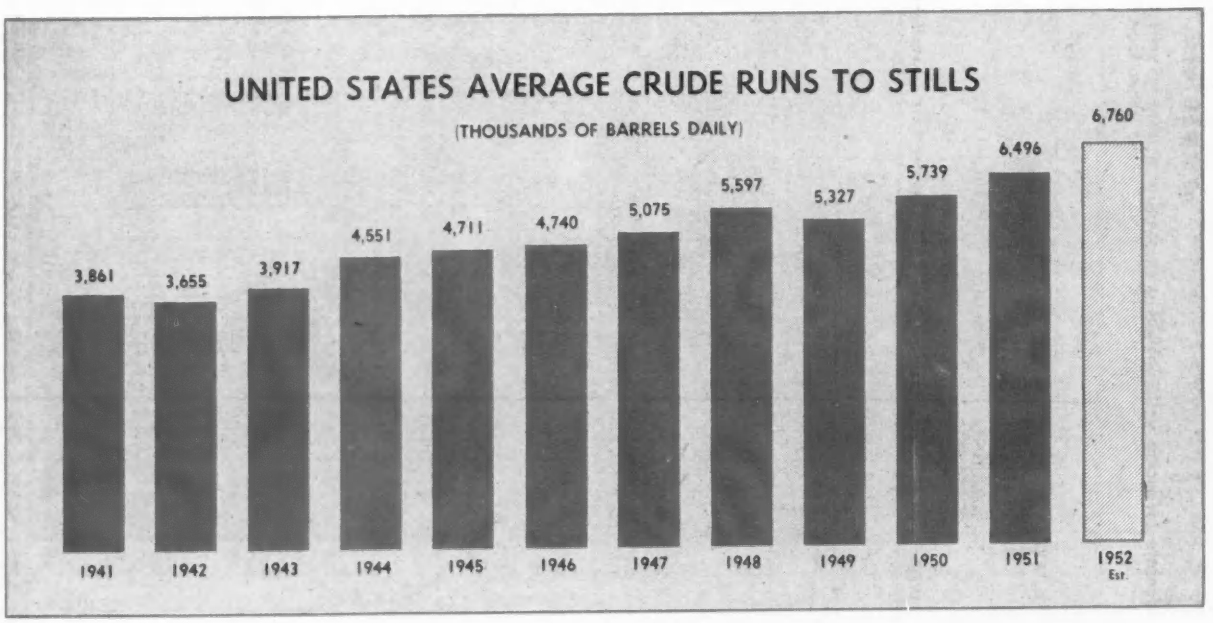
THE highest refinery capacity on record made possible a peak daily average crude runs to stills of 6,496,300 barrels during 1951.

This hike of 757,000 barrels per day in runs to stills was partly explained by the increase in daily refinery capacity from 6,724,000 barrels in the latter part of 1950 to 7,229,000 in December, 1951.

This increase in refinery capacity is not expected to be equaled in 1952 due to the tight materials situation. Many construction programs originally scheduled for completion in 1951 have been set back by shortages of steel, and some projects slated for 1952 operation will not be available until possibly early in 1953.

A survey compiled by The American Petroleum Institute for the first nine months of 1952 indicated that total domestic operable refining capacity by the end of next September will be 7,365,600 barrels daily, which would be an increase of 136,600 barrels over the figure for December, 1951.

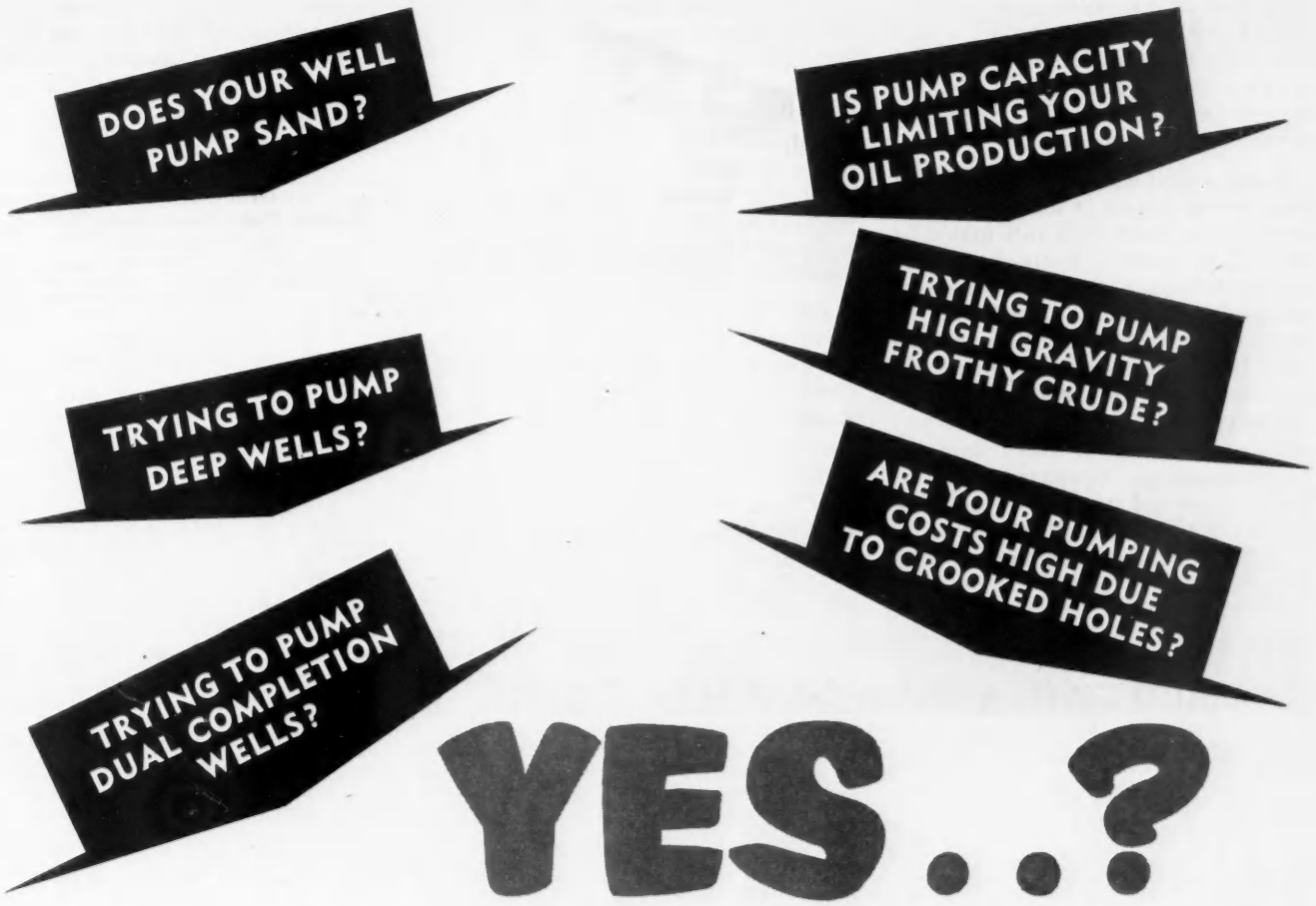
While the additions to capacity in 1951 were ahead of the Petroleum Administration for Defense's over-all refinery program of new capacity, which was for 1 million barrels a day to be on stream in 1953, the present indicated construction program for the first three quarters of 1952 will set this program back considerably. PAD's first plan had been to make



(All Figures in Barrels)

YEAR	Annual Total	Daily Average	YEAR	Annual Total	Daily Average	YEAR	Annual Total	Daily Average	YEAR	Annual Total	Daily Average
1918	326,025,000	893,200	1927	828,835,000	2,270,800	1936	1,068,570,000	2,919,000	1945	1,719,534,000	4,711,000
1919	361,520,000	990,500	1928	913,295,000	2,295,300	1937	1,183,440,000	3,242,000	1946	1,730,197,000	4,740,000
1920	433,915,000	1,185,600	1929	987,708,000	2,706,100	1938	1,165,015,000	3,191,800	1947	1,852,246,000	5,074,600
1921	443,363,000	1,214,700	1930	927,447,000	2,541,000	1939	1,237,840,000	3,391,000	1948	2,048,349,000	5,596,600
1922	500,706,000	1,371,800	1931	894,608,000	2,451,000	1940	1,294,283,000	3,536,300	1949	5,944,221,000	5,326,600
1923	581,238,000	1,592,400	1932	819,997,000	2,240,400	1941	1,409,192,000	3,860,800	1950	2,094,867,000	5,739,400
1924	643,719,000	1,758,800	1933	861,254,000	2,359,600	1942	1,334,103,000	3,655,000	1951	2,371,168,000	6,496,300
1925	739,920,000	2,027,200	1934	895,636,000	2,453,800	1943	1,429,738,000	3,917,000			
1926	779,264,000	2,135,000	1935	965,790,000	2,646,000	1944	1,665,684,000	4,551,000	1952 Est.	2,474,160,000	6,760,000

Source: U. S. Bureau of Mines, except 1951, which has been calculated from Bureau of Mines for first 10 months and American Petroleum Institute weekly reports for last two months.


DOES YOUR WELL PUMP SAND?
IS PUMP CAPACITY LIMITING YOUR OIL PRODUCTION?
TRYING TO PUMP HIGH GRAVITY FROTHY CRUDE?
TRYING TO PUMP DEEP WELLS?
ARE YOUR PUMPING COSTS HIGH DUE TO CROOKED HOLES?
TRYING TO PUMP DUAL COMPLETION WELLS?
YES . . ?

You should be gas lifting if you answer "yes" to any of these questions. More economical than bottom hole pumps in *any* well, gas lift **really** saves you money under these conditions.

Gas lift valves produce sand-laden fluids without cutting or sticking!

Gas lift valves function just as well in crooked holes as they do in straight ones, with no additional wear on tubing or lifting equipment!

Gas lift valves produce deep wells with ease, and the equipment is identical with that used to produce shallow ones.

Gas lift valves are perfect for lifting light, gas-cut oils . . . they supply the little assistance required at very low cost!

Gas lift valves permit selective or simultaneous production of the formations in dual completion wells, with positive separation of the fluids!

Gas lift valves can lift tremendous volumes of fluid . . . the high volume producers are the easiest of all to gas lift!

No high pressure gas? Even lack of that won't keep you from gas lifting now. Closed, rotative gas lift systems using packaged compressor plants are very economical to install and operate. Even when gas must be compressed, *gas lift still produces your oil for less.*

For lowest lifting costs, *use gas lift.* For the finest in gas lift, install GOT-OLSCO valves and controllers. An experienced representative is nearby to serve you.

SALES AND SERVICE

Houston	Beaumont	Hobbs
Tyler	Alice	Oklahoma City
Odessa	Jennings	Los Angeles
Corpus Christi	Houma	Casper
Victoria	Monroe	Calgary
Longview	Shreveport	Anaco, Ven.

got

Garrett Oil Tools, Inc.

P. O. BOX 6115 HOUSTON 6, TEXAS

Manufacturers and distributors of the world's most complete line of gas lift valves

ARE YOU PUMPING . . .

WHEN YOU COULD BE GAS LIFTING?

annual additions to capacity at the rate of 500,000 barrels daily in 1951 and 1952. This was revised downward to new-capacity additions of 350,000 barrels per day over a three-year period.

If the actual total operable refining capacity on stream at the end of September is no more than anticipated by the API, it would indicate that, based on the Bureau of Mines estimate of required crude runs to stills in the third quarter of the year averaging 6,800,000 barrels daily, refinery operations in the July-September period will have to be scheduled at 93.5 percent of capacity to meet demand. Correspondingly, operations in the first and second quarters of this year will have to average 91.8 percent of capacity. This would compare with runs to stills averaging slightly in excess of 90 percent of capacity in the last six months of 1951.

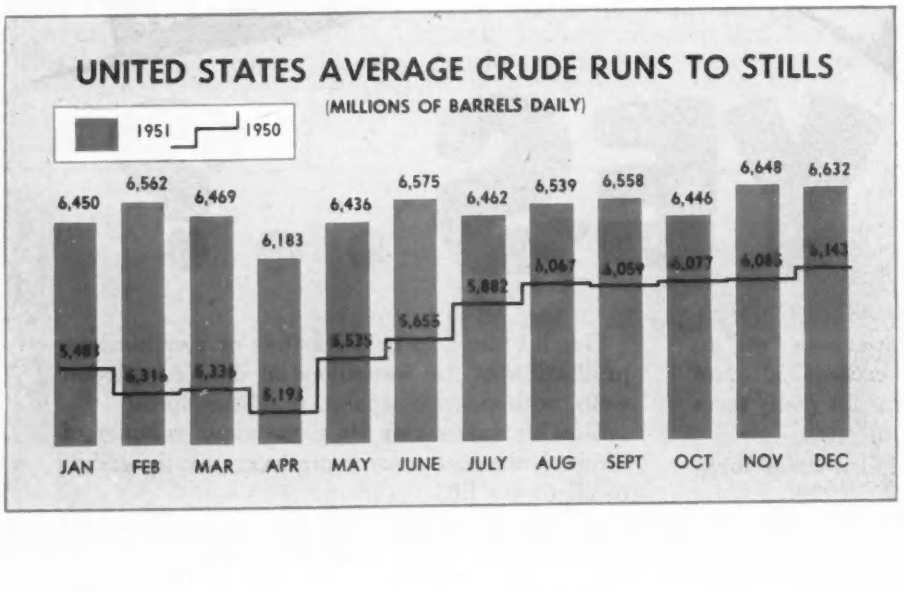
Refinery Gasoline Output

Output of refinery gasoline (straight run, cracked and natural blended at refineries) totaled 1,009,393,000 barrels during 1951 or 2,765,000 barrels per day. This was a gain of 11.2 percent over 1950.

For the second consecutive year there was an unusually sharp gain in yield of distillate fuel oils. Production reached a high of 477,149,000 barrels during the year for a 19.6 percent gain over 1950.

Lubricants production also set a new high with a total of 62,178,000 barrels during the year for a 20.2 percent gain.

Residual fuels production showed a 10.3 percent increase in moving up to 469,188,000 barrels; and kerosine output was up 14.0 percent for a total of 135,056,000 barrels.



Refinery Production of Major Products and Percent Yield from Crude Run at U. S. Refineries

Results in December and Year 1951, compared with same periods in 1950. Figures are from Bureau of Mines except that November and December, 1951, are estimated with aid of A.P.I. weekly bulletins.

(THOUSANDS OF BARRELS)

ITEM	1950	1951	Percent Dif.
Gasoline			
Production, December	80,319	89,387	11.1
(Daily Average)	2,591	2,883	11.1
Percent Yield	41.1	43.3	....
Production, Year	903,707	1,009,393	11.2
(Daily Average)	2,476	2,765	11.2
Percent Yield	43.0	42.4	....
Kerosine			
Production, December	11,261	11,608	10.3
(Daily Average)	363	374	10.3
Percent Yield	5.8	5.6	....
Production Year	118,512	135,056	14.0
(Daily Average)	325	370	14.0
Percent Yield	5.6	5.7	....
Distillate			
Production, December	41,628	45,515	10.9
(Daily Average)	1,343	1,468	10.9
Percent Yield	21.3	22.0	....
Production, Year	398,912	477,149	19.6
(Daily Average)	1,093	1,307	19.6
Percent Yield	19.0	20.0	....
Residual			
Production, December	40,475	40,197	9.9
(Daily Average)	1,306	1,297	9.9
Percent Yield	20.7	19.5	....
Production, Year	425,217	469,188	10.3
(Daily Average)	1,165	1,285	10.3
Percent Yield	20.2	19.7	....
Lubricants			
Production, December	5,068	5,578	11.0
(Daily Average)	164	180	11.0
Percent Yield	2.6	2.7	....
Production, Year	51,735	62,178	20.2
(Daily Average)	142	170	20.2
Percent Yield	2.5	2.6	....

Crude Runs to Stills in U. S. Refineries and Percent Refinery Capacity Used by Districts, December and Years, 1950 and 1951

Runs from Bureau of Mines, except November and December, 1951, from American Petroleum Institute: Capacities from American Petroleum Institute.

(THOUSANDS OF BARRELS)

Refining District	CRUDE RUN IN DECEMBER: Total Amount Run During Month			CRUDE RUN IN DECEMBER: Daily Average Run During Month		REFINING CAPACITY AND USE IN DECEMBER: Daily Capacity		REFINING CAPACITY AND USE IN DECEMBER: Percent Capacity Used		CRUDE RUN DURING YEAR: Total Amount Run During Year		CRUDE RUN DURING YEAR: Daily Average Run During Year		
	Dec., 1950	Dec., 1951	% Diff. '50-'51	Dec., 1950	Dec., 1951	Dec., 1950	Dec., 1951	Dec., 1950	Dec., 1951	1950	1951	1950	1951	% Diff. '50-'51
East Coast	29,490	32,438	+10.0	951	1,046	1,013	1,094	93.9	95.6	331,368	370,108	908	1,014	+11.7
Appalachian	4,952	5,723	+15.6	160	185	191	194	83.8	95.4	60,382	65,366	165	179	+ 8.5
District No. 1	2,932	3,180	+ 8.5	95	103	117	116	81.2	88.8	35,115	37,608	96	103	+ 7.3
District No. 2	2,020	2,543	+25.9	65	82	74	78	87.8	105.1	25,267	27,758	69	76	+10.1
Ill., Ind., Ky.	34,200	38,621	+12.9	1,103	1,246	1,178	1,317	93.6	94.6	379,143	438,106	1,039	1,200	+15.5
Okla., Kans., Mo.	15,928	16,848	+ 5.8	514	543	557	615	92.3	88.3	177,285	190,347	486	521	+ 7.2
Texas Inland	6,641	7,560	+13.8	214	244	279	290	76.7	84.1	76,221	89,662	209	246	+17.7
Texas Gulf Coast	46,695	49,944	+ 7.0	1,506	1,611	1,592	1,667	94.3	96.6	479,085	571,794	1,312	1,567	+19.4
Louisiana Gulf Coast	15,457	15,833	+ 2.4	499	511	474	507	105.3	100.8	171,407	183,359	470	502	+ 6.8
Ark., and La. Inland	2,136	2,272	+ 6.4	69	73	86	88	80.2	83.0	26,107	28,953	71	79	+11.3
Rocky Mountains	7,051	7,328	+ 3.9	228	236	249	272	91.6	86.8	72,539	83,934	199	230	+15.6
District No. 3	452	481	+ 6.4	15	15	17	22	88.2	68.2	4,963	5,381	14	15	+ 7.1
District No. 4	6,599	6,847	+ 3.8	213	221	232	250	91.8	88.4	67,576	78,553	185	215	+16.2
California	27,898	29,036	+ 4.1	900	937	1,105	1,185	81.4	79.1	321,330	349,539	880	958	+ 8.9
Total U. S.	190,448	205,603	+ 8.0	6,144	6,632	6,724	7,229	91.4	91.7	2,094,867	2,371,168	5,739	6,496	+13.2

LPG

Sales Advance Again

By K. W. RUGH and GEORGE R. BENZ
Phillips Petroleum Company, Bartlesville, Okla.

THE steady, rapid growth and expansion of the liquefied petroleum gas industry continues unabated as it has since its progress was first summaried in early 1929. Sales of LPG in 1951 reached an estimated 4100 million gallons, exclusive of any product used in the manufacture of aviation and motor gasoline or synthetic rubber. This is an increase of 25.9 percent over 1950. The gallonage increase of 846 million gallons is almost equal to the total sales of 1944.

The demand seems insatiable. Shortages in winter are apt to be felt again, especially if colder-than-normal weather occurs. The industry entered this winter with its storage in better shape than a year ago. The storage and transportation picture appears brighter for 1952.

The industry is once again beset with material shortages and resultant allocations and by price regulations on its products and supplies.

The LPG industry ranks as one of the major suppliers of energy in the country. It is viewed by many as the fastest-growing segment of the petroleum industry and one of the fastest-growing industries in the country today.

With this report, the writers are making a change in the method of reporting LPG sold for fueling internal combustion engines. This change brings under one heading—"Domestic and Motor Fuel"—all LPG sold directly by producers and marketers as direct motor fuel plus all LPG sold by distributors.

Prior to 1951, LPG sold direct by producers and marketers to consumers using it solely for fueling internal combustion engines was reported under the "Industrial and Miscellaneous" heading. LPG sold by domestic distributors but ultimately used as internal engine combustion fuel was reported under the "Domestic" heading.

Sales of LPG for domestic and motor fuel purposes are estimated at 2868 million gallons in 1951, an increase of 32.5 percent over 1951 sales and far in excess of total sales of the entire industry in 1949.

The extreme cold experienced in most parts of the country during the early months of 1951 added greatly to consumer demand for heating purposes. Colder than normal weather in the fall and early winter of 1951 likewise increased the LPG heating load. A dry spring and summer in sections of the southwest greatly increased the demand for LPG as a fuel for irrigation pumps. Conversely, extended rains and serious floods in many sections reduced sales and deliveries of LPG in certain areas. Increased sales in this category of 704 million gallons over 1950 clearly show, however, that domestic and motor fuel use of LPG are continuing their phenomenal rise.

Direct motor fuel use of LPG continued its rapid gain in 1951 although actual gallonage used for internal combustion engines is impossible to estimate accurately.

Sale of LPG conversion equipment for farm tractors continued at a high level in 1951. Use of the product by trucks, buses and taxi fleets also

Marketed Production of Liquefied Petroleum Gas

Year	TOTAL SALES		DISTRIBUTION—1,000 Gallons							
	Gallons in Thousands	Percent Increase	Domestic and Motor Fuel[1]	Percent Increase	Ind. and Miscl.[2]	Percent Increase	Gas Mfg.	Percent Increase	Chemical Mfg.	Percent Increase
1922	223	....								
1923	277	24.4								
1924	376	36.0	Sale of Liquefied Petroleum Gas Confined Primarily to Bottled Gas Business Prior to 1928							
1925	404	7.2								
1926	465	15.2								
1927	1,091	134.6								
1928	4,523	314.6	2,600	....	400	....	1,500	.....	.....	.....
1929	9,931	119.6	5,900	126.9	1,500	275.0	2,500	66.7	.....	.....
1930	18,017	81.4	11,800	100.0	2,200	46.7	4,000	60.0	.....	.....
1931	28,770	59.7	15,295	29.6	7,172	226.0	6,303	57.6	.....	.....
1932	34,115	18.6	16,244	6.2	8,167	13.9	9,703	53.9	.....	.....
1933	38,931	14.1	16,626	2.3	13,987	71.3	8,318	—14.3	.....	.....
1934	56,427	44.9	17,681	6.3	32,448	132.0	6,298	—24.3	.....	.....
1935	76,855	36.2	21,380	20.9	47,894	47.6	7,581	20.4	.....	.....
1936	106,652	38.8	30,014	40.4	67,267	40.4	9,371	23.6	.....	.....
1937	141,400	32.6	40,823	36.0	62,610	[3]	11,175	19.3	26,792	.....
1938	165,201	16.8	57,832	41.7	62,694	0.0	12,386	10.8	32,299	20.5
1939	223,580	35.3	87,530	51.4	93,723	49.4	15,435	24.6	26,892	—16.7
1940	313,456	40.2	134,018	53.1	124,482	32.8	20,285	31.4	34,671	29.0
1941	462,852	47.7	220,722	64.7	172,669	38.6	25,255	24.5	44,206	27.5
1942	585,440	26.5	303,857	37.6	197,179	14.2	31,366	24.2	53,038	20.0
1943	675,233	15.3	344,962	13.6	237,396	20.4	37,519	19.6	55,356	4.4
1944	898,071	33.0	445,617	29.2	254,590	7.3	45,879	22.3	151,985	175.0
1945	1,067,979	19.0	533,262	19.7	256,577	0.8	53,849	17.4	224,291	47.5
1946	1,410,370	32.1	758,466	42.2	253,745	—1.1	86,660	61.0	311,499	38.8
1947	2,008,262	42.4	1,150,538	51.7	274,125	8.0	169,332	95.4	414,267	33.0
1948	2,511,160	25.0	1,473,289	28.1	275,883	0.6	237,638	40.3	524,350	26.6
1949	2,658,749	5.9	1,627,550	10.5	247,103	—10.4	239,210	0.6	544,886	3.9
1950	3,254,082	22.4	2,034,464	24.9	355,456	[4]	251,694	5.2	612,468	12.4
1951	4,100,000	25.9	2,868,000	[4]	230,000	[4]	252,000	0.0	750,000	22.5

[1] Household use plus other requirements by these customers such as irrigation pumping, tractor fuel, flame weeding, chicken brooding and similar uses. Included also is LP-Gas sold by domestic distributors, but used for industrial purposes, internal combustion engine fuel and for gas manufacturing purposes. Included also, in 1951 only, is LP-Gas sold direct by producers and marketers solely for fueling internal combustion engines. (See special note.)

[2] For all years prior to 1951, includes LP-Gas sold for fueling internal combustion engines. (See special note.)

[3] Not comparable due to segregation of chemical manufacturing.

[4] Not comparable due to change in method of reporting LP-Gas sold for fueling internal combustion engines.

REMARKS: In this table total sales for all years except 1951, were obtained from U. S. Bureau of Mines reports. Distribution for the years 1931 to 1950, inclusive, was obtained from the same source. All other volumes were estimated by the writers. The total sales volume includes all LP-Gas (propane, butane and propane-butane mixtures) when sold as such. Until 1944 the sale of pentane when sold for any purpose other than motor fuel blending was included. Since then it has been excluded. It does not include butane when blended with heavier petroleum fractions for motor gasoline purposes. Intercompany sales transactions such as purchases of LP-Gas by one company from other companies and resold as LP-Gases have been eliminated in order to avoid duplication of sales figures. The data do not reflect sales of LP-Gases used directly by the producer at the point of production for fuel polymerization, solvent, de-waxing, etc. Neither do the figures include sales of hydrocarbons to plants manufacturing synthetic rubber or aviation gasoline or their components.

showed large gains during the year. Well over 1000 city and inter-city buses using LPG have been put in operation in the last 18 months. Several major manufacturers of heavy duty engines are contemplating production of factory-engineered and produced LPG-burning engines. The large potential market for direct motor fuel use of LPG is barely touched as yet.

Industrial Use

LPG sales for industrial and miscellaneous purposes totaled an estimated 230 million gallons at year's end, an increase of 2 percent over 1950. The last quarter of 1950 brought a definite upsurge in LPG sales to industry as the country's defense program swung into high gear at various manufacturing plants. This activity, plus the effects of decentralization of new defense plants to locations beyond gas mains and a sustained high level of most industrial activity all contributed to higher LPG sales. Counterbalancing effects were caused by the increased availability of natural gas in many industrial areas and by the many temporary plant shutdowns necessitated by a switch from production of consumer goods to defense items. As defense production continues to rise, further gains in LPG use by industry can be expected.

Sales of LPG to utilities are estimated at 252 million gallons in 1951, the same as 1950. Extension of natural gas lines to new locations and additional supplies of natural gas to areas where it was already available continued during the year. The long term effect of such activities is to increase the potential LPG use by utilities for standby purposes. The short term effect, however, is to reduce actual LPG demand. Shortage of LPG transportation during the early months of 1951 also reduced LPG sales to utilities in that period. This tight winter situation emphasized the important point that, for standby use, utilities must have ample LPG storage facilities—and the storage must be filled during the summer months. Increased sales of LPG to utilities for augmenting supply can be expected.

Chemical Manufacture

Sale of LPG as a raw material for the manufacture of chemicals and of chemical intermediates again set an all-time high during 1951. Total sales for this use are estimated to be 750 million gallons, an increase of 22.5 percent over 1950. If the large volumes of LPG used in the manufacture of components of synthetic rubber and aviation gasoline were to be included, the total would be considerably higher. It is estimated that 344 million gallons of LPG were used during 1951 by the synthetic rubber industry alone. This compares with 228,485,000 gallons in 1950.

The petrochemical industry grew very rapidly during 1951, especially in the Gulf Coast area, where it is estimated that plant projects announced, started or completed, involved the expenditure of more than $250 million. Basic raw materials for these plants include LPG, oil and natural gas. These new plants insure an increasing demand for LPG by the chemical industry.

Safety

The industry is doing a commendable job developing and practicing sound safety standards. Through its national Liquefied Petroleum Gas Association it works closely with NBFU and NFPA collectively, and individually with the state regulatory bodies. NFPA Standard No. 58 was again revised in 1951 to reflect current developments and to keep its rules up to date with safety requirements.

The present supply situation is very tight and many current indications point to another winter shortage. The Committee on Liquefied Petroleum Gas Availability, Transportation and Material Requirements appointed by the National Petroleum Council in May, 1951, has reported maximum monthly production capacity up 15.7 percent over last year. The increased demand of 25.9 percent in 1951 over 1950 indicates a relatively increasing consumption of LPG during the off-peak demand months.

Reasons for the present tight supply situation include the delay some major producing sources experience in getting on stream, and disappointing production volumes from some new plants. Plants which recover a high percent of the available propane require much larger investment in facilities and equipment and have higher operating costs than the usual type of plant. Such plants are not attractive to investors and operators unless favorable year-around prices are received for the LPG.

At many refineries C_3 and C_4 hydrocarbons in increasing quantities are now being converted to motor and aviation gasoline by polymerization and alkylation processes which yield the refiner better return than if sold for LPG. The change from 13.5 to 15 pound RVP motor gasoline during the winter months in northern areas may require as much as 420 million gallons more of butane than heretofore.

All of these, coupled with the great demand for LPG for house heating and generally inadequate consumer storage for this demand has resulted in the present (and future) critical supply balance during the winter months.

Storage, historically, has always been a major industry problem because of the relatively high cost of pressure-type steel storage tanks. However, many producers now have programs under way for adding to their primary storage capacity. The types which presently offer the best solution are the underground storage caverns. These may be washed in salt beds or domes or may be mined in suitable limestone or shale formations and have capacities up to 100,000 barrels (4.2 million gallons) or more. Many of these were not completed in time to fill them during the summer months so their effect will be more fully realized next winter.

Transportation Methods

The volume movement of LPG from large producing areas has resulted in the adoption of transportation methods used to move the large volumes of other petroleum products. Another barge has been constructed for coastwise hauling and another terminal constructed during the year. A pipe line for the movement of propane from the Texas Panhandle to the Chicago area is under construction. Pipe line movement of LPG has proven to be practical and economical with several lines now in operation.

Since it is estimated that 50 percent of the LPG is transported by tank car, a review of the tank car situation is important. The Defense Transportation Administration census of tank cars as of January 1, 1951, revealed that there were 10,302 pressure cars in liquefied petroleum gas service.

As of October 1, 1951, 1270 cars had been added to the fleet during the year making a total of 11,572 cars in service with 1071 additional to be placed in service by the end of 1951. In addition to these cars a large number have been constructed for dual service (anhydrous ammonia-liquefied petroleum gas).

The year's progress indicates a continuing increased demand for LPG comparable with that experienced in the past. There are indications that production will have difficulty in keeping pace with the demand during peak winter months. This unbalanced supply versus demand condition is influencing larger storage at all stages of the distribution channels. The results of this influence can make it possible for the industry to balance its demands and supply in a reasonable period of time.

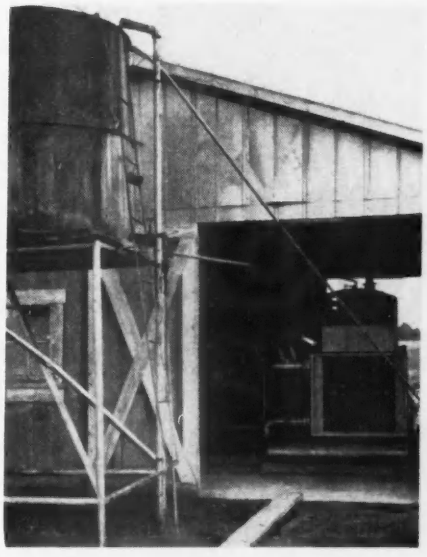
How to do it! PRODUCTION HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.

HOW TO—Assure Adequate Supply of Makeup Water

A salvaged water tank, open at the top, serves as a storage and volume tank to provide a small gas-lift compressor station with makup and cooling water. Elevating it on a platform provides sufficient head to flow water to the engine radiator and to the jacket water cooling system on the compressor.

A simple platform about eight feet high was made of salvaged 2½-inch pipe. It was cross braced and the top was covered with 3x8-inch timber. Supply for the tank comes from a gas lift water well near the compressor station. The water tank serves as a volume tank for the compressor engine radiator. A small centrifugal pump takes suction on the bottom of the radiator and pumps the water into the tank. This discharge line is shown leading down to the floor of the station at lower right.



Water is continuously fed into the radiator by a fill line leading from the bottom of the water tank and crossing over the compressor. A gate valve on the fill line at the radiator controls the flow of water through the radiator. However, the connection is welded to the radiator and the overflow line closed so that the radiator is always filled. As long as the engine is running, the centrifugal pump moves water through the radiator and back into the reserve tank.

With a relatively large volume of water available and with the tank elevated, the radiator is assured a continuous supply of water. The pressure inside the radiator is not great since the water tank is not elevated much higher than the radiator itself.

HOW TO—Minimize Vaporization in Oil Stock Tanks

Minimizing vaporization in oil stock tanks is a perennial problem for which there are many possible solutions. In summer, vaporization from light crudes can be expected to be higher than winter. A tank breathing line mounted across the top of each tank in the battery is a conventional installation today. The breather line extends about 30 or 40 feet beyond the last tank where it is open to the atmosphere.

In some cases, sufficient gas can be taken from stock tanks to serve as part of the charge gas stream for natural gasoline plants. This can be done if the breather system has a means of holding a slight pressure on the tanks or permitting a small vacuum on them. In this installation, a four-inch breather line was mounted across the peaks of each stock tank and connected to a pressure-vacuum tank vent, shown in the background.

The smaller of the two parallel lines shown carries gas vapors to a gasoline plant nearby. Regulators on this line prevent pulling too large a vacuum and open when the vaporization is excessive.

The pressure-vacuum tank vent on the breather line exhausts through a right angle bend. When large volumes of oil flow into the tanks, and the vent opens to expel excessive gas, some liquid fractions may be carried over and spilled on the tank roofs. To remove any liquids that may be carried over by the gas, a galvanized sheet metal funnel is supported so the discharge from the tank vent spills into it. A small ¾-inch line carries any liquids to the battery sump where they can be pumped back into the tank.

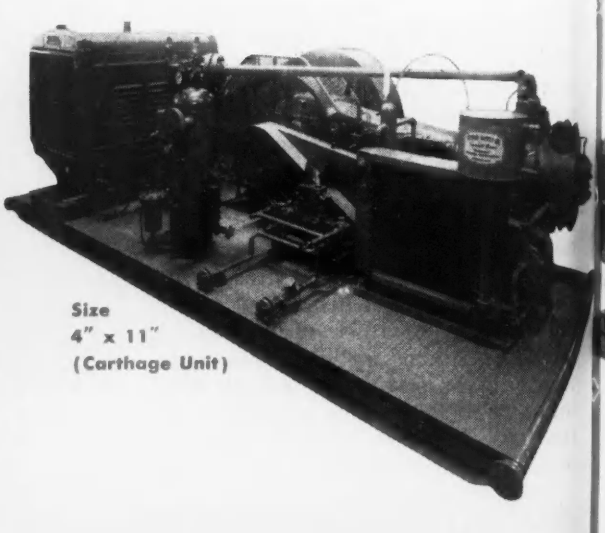
WILSON SUPPLY
INGERSOLL-RAND
"Packaged" Portable
COMPRESSORS
are giving
OUTSTANDING
CONTINUOUS
PERFORMANCE
in
THE FIELD
from
NEW MEXICO
to
MISSISSIPPI
from
SOUTH TEXAS
to
OKLAHOMA

ANTICIPAT
NOW ..

In Gas-Oil Lift, Repressuring and Boost work Wilson Supply—Ingersoll-Rand "Pac aged" Portable Compressors have won wi acceptance from the Producing Industry.

These "Packaged," Portable Compresso are built, assembled and mounted to gi long, continuous, trouble-free performanc They do not require the constant attentio of a skilled Compressor man. They a equipped with many automatic safety fea tures which protect the equipment in even of mishap when the attendant is not presen

These "Packaged" Portable machines a mounted on heavy skids and take the plac of far more costly permanent installations They can be furnished in the size to best mee your specific requirements.



Size
4" x 11"
(Carthage Unit)

YOUR COMPRESSOR NEEDS FOR 1952

and Avoid Delays Caused by Possible Slow Deliveries

The demand for Wilson Supply–Ingersoll-Rand "Packaged" Portable Compressors is increasing every month. This, added to the critical material supply, has created a situation that often tends to unavoidable delays in delivery.

Operators who are able to anticipate their Compressor needs several months in advance and place their orders NOW, will avoid those delays and have their Compressors on hand when the need arises.

While Wilson Supply Company carries some sizes of Compressors in stock, varying field conditions and requirements make it impossible to carry *all sizes*. This applies to both Compressor Cylinders and Engines.

Contact your nearest Wilson Supply Company Store or write "Compressor Division," Wilson Supply Company, P. O. Drawer 19, Houston, Texas, for detailed information, and quotations. Please give suction and discharge pressure and volume to be handled.

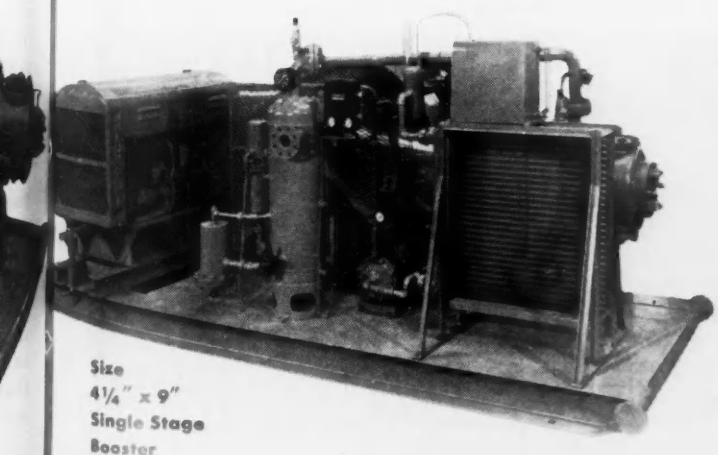
WILSON SUPPLY COMPANY

BRANCH STORES

Texas—Alice, Corpus Christi, Victoria, Bay City, Columbus, Barbers Hill, Liberty, Beaumont, Kilgore, Monahans. **Louisiana**—Lake Charles, New Iberia, Houma, Harvey, Shreveport.

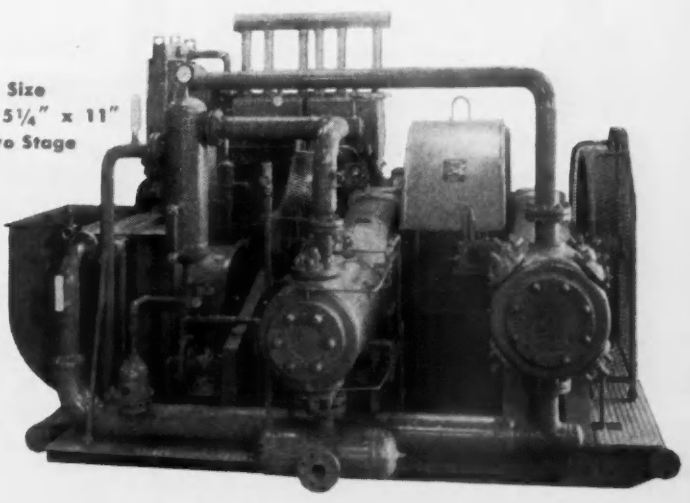
1412 MAURY ST.
HOUSTON
TEXAS

Sales Offices:
DALLAS, TEXAS
TULSA, OKLAHOMA
NEW ORLEANS, LA.
SHREVEPORT, LA.

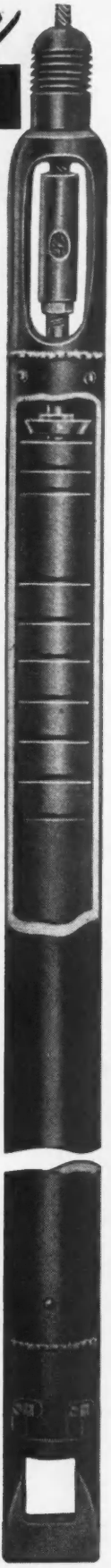


Size
4¼" x 9"
Single Stage
Booster

Size
10" x 5¼" x 11"
Two Stage



Miller SAND PUMPS



In every major producing area where sand or sediment is a problem, you'll find Miller Sand Pumps and Bailers are standard . . . the leaders in clean-out equipment. For 26 years Miller has held this leadership, with continuous improvements and faithful service.

The Miller Sand Pump is made in regular and heavy duty types in sizes listed below. Lug type, chisel, sand and bailer bottoms are easily interchanged.

SAND PUMP and BAILER SIZES

Outside Diameters

2½"
3"
3½"
4¼"
5"
5½"
7"

Lengths

20 feet
25 feet
30 feet

Special Sizes and Lengths Made to Order!

Write for new descriptive price list on Miller Sand Pumps and Bailers. See Composite Catalogue Page 3305 for details.

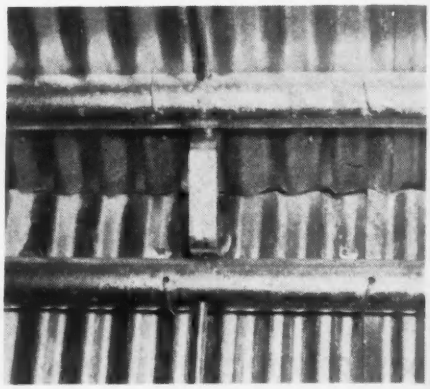
MILLER SAND PUMP CO.

1524 S. E. 29 St. . . . . Box 4516

OKLAHOMA CITY 9, OKLAHOMA

HOW TO—

Use Salvaged Pipe In Metal Building

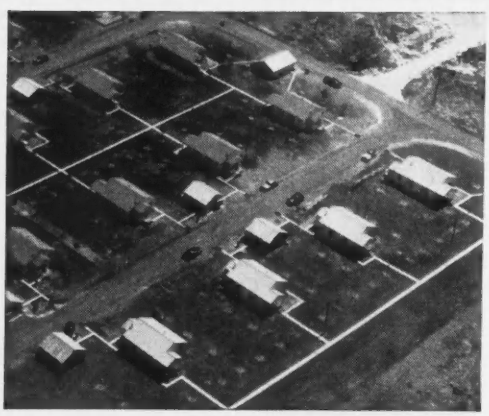


The big advantages in using steel pipe in constructing oil field buildings are strength and the elimination of a fire hazard. A great deal of corroded tubing and flow line pipe have been used in small buildings by means of a simple measure that permits nailing sheet steel to the pipe. A sturdy framework can quickly be welded on the spot, but nailing corrugated sheet metal to the pipe poses a problem.

The illustrated method of joining these materials has been accomplished in the field. The two parallel pieces of salvaged pipe form what is known as the ridge pole, or the peak of the roof. By utilizing two sections, the sheet metal on either side of the peak can be securely tied down. The two pipes are held in position by a joining bracket which is braced to the wall caps by sucker rod members with turnbuckles that can be tightened.

After the framework has been welded in place, the sheet metal roof is placed on top. A small electric drill is used to bore holes through the corrugated sheet metal and the pipe members. A large galvanized nail fitted with an asphaltic gasket is driven in the hole. A workman below the roof hammers to one side that part of the nail extending through the two-inch pipe. This method of construction makes it easy to remove the sheeting and disassemble the building should it be necessary to move it, while at the same time providing adequate strength in holding the metal to the framework.

CASE HISTORIES of Houston Ready-Cut Installations



Shell Oil Company's TXL Gasoline Plant Camp Site at No Trees, Texas—A total of 23 units were completed at this camp by Houston Ready-Cut House Co. Materials were delivered, construction begun and finished, turnkey, exactly on schedule all under the careful supervision of our own crews. Homes are comfortable, attractive and well-constructed for years of use.

IMMEDIATE DELIVERY anywhere in the world

What are YOUR Needs?

★ 1 HOUSE OR 100

★ INDIVIDUAL UNITS, OFFICE BUILDINGS OR DORMITORIES

★ ERECTED COMPLETE OR FOR ERECTION BY YOUR CREWS

FREE SURVEY- phone or wire for a personal survey and estimate *without obligation.*

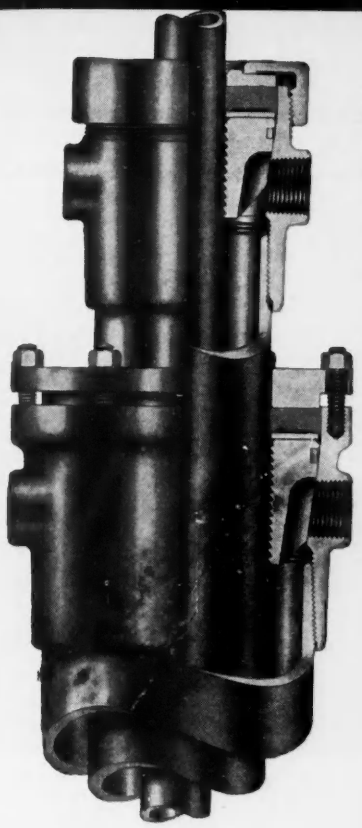
HOUSTON Ready-Cut HOUSE CO., Inc.

Prefabricated Housing for Industry Since 1917

P. O. BOX 124 HOUSTON 1, TEXAS

RECTOR REDHEAD

gives you widest variety of low-pressure casing and tubing head arrangements.



Type R Forged Steel Casing and Tubing Heads

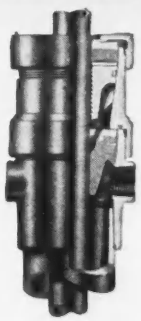
Designed and manufactured by the industry's leading producer of high pressure heads, the RECTOR REDHEAD has innumerable features that put it far ahead of the field of low cost, low pressure, forged steel casing and tubing heads.

Ruggedly constructed, the bodies have greater thickness and strength than any casing or tubing to which they will be attached. Case hardened slips are three-segment type with ribbed construction to permit full flow to the outlets. An oil resistant pack-off rests on a split junk ring directly on the slips. On the casing heads this packing is secured by a split gland bolted to the head body. On the tubing head it is secured by a gland tightened down by a screw cap on top of the head.

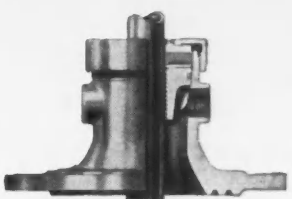
A slip bowl adapter is available to carry slips, packing and gland so that a stripper can be carried in the tubing head body. Stripper and slips are interchangeable in bowl and head body so that two strippers can be used.

Type R Casing and Tubing Heads are available with flanged or threaded bottom connection. Male threaded and flanged drilling adapters are available for screwing on top of the Tubing Head. A special threaded mandrel is available when head is used with Kobe Pump.

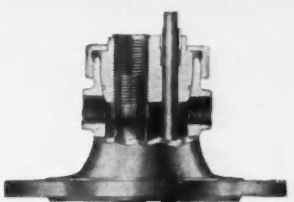
Ask your nearest Rector Representative, authorized Supply Store, or write for complete details about the Rector Redhead.



● Threaded bottom Type R Tubing Head with slips and stripper. For work-over jobs a second stripper can be used in place of the slips in the adapter bowl. Slips and stripper are interchangeable in head and bowl.



● The Type R Tubing Head with light flange for use on low pressure well having a flanged casing head . . . or to replace high pressure tubing head and tree when changing from flowing to pumping conditions.



● The original tubing head installation can be adapted to the Kobe Pump simply by using the special threaded mandrel with stuffing box for the power lines. The mandrel, resting on a ground joint seat, has an "O" ring seal.

● Type "R" Casing Head with threaded bottom. Notice how ribbed construction of slips permits full flow to side outlets, also simplicity and effectiveness of sealing arrangement.

RECTOR WELL EQUIPMENT COMPANY INC

★ MAKING THE OIL INDUSTRY SAFER ★

1100 NORTH COMMERCE ST. FORT WORTH, TEXAS

Houston Plant: 2215 Commerce St.

REPRESENTATIVES IN ALL ACTIVE FIELDS

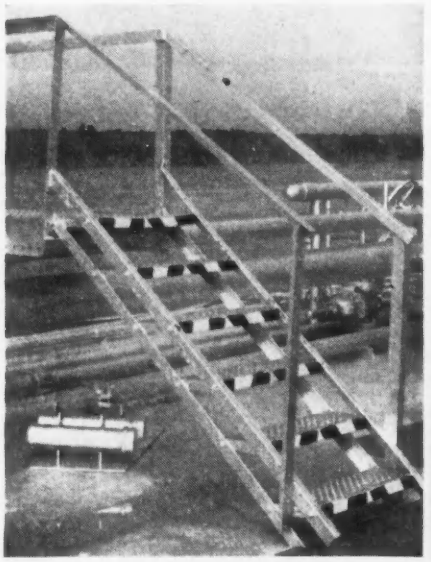
RECTORHEAD RECTOR FULBORE CEMENTING METHOD RECTORSEAL

ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

HOW TO—Label Steps Over Piping

A potential stumbling hazard can be eliminated by adequately labeling walkways which cross over longitudinal piping on the decks of production barges. Since barges must be loaded and moved at all hours of the day and night, illuminating the edges of walkway steps will aid operating personnel to see them even in subdued light.

Illustrated is a method of painting the edges of each step of a walkway



over barge piping. Alternate stripes of black and luminescent yellow are painted on the turned down edge of each step. The stripes incline toward the middle of the step. These alternate stripes of highly-contrasting colors, one of which glows in the dark, will help prevent accidents to personnel.

JENSEN Units are Practical and Proven

JENSEN Pumping Units are not designed and built by theorists and swivel-chair engineers. Our units have grown out of more than 30 years of field experience.

History and well kept records back our contention that any well is likely to be more profitable and less trouble when JENSEN equipped.

See our pages in the Composite Catalog, or write for specifications and prices.

JENSEN

BROS. MFG. CO., INC., COFFEYVILLE, KAN.

EXPORT OFFICE: 50 CHURCH ST., NEW YORK CITY

HOW TO—Build Gate With Scrap Sucker Rods

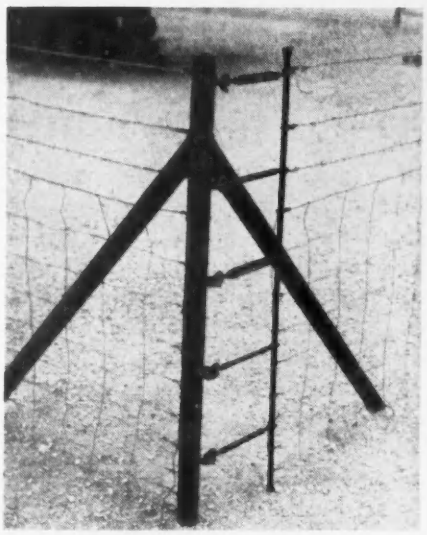
A well enclosure gate, unusually simple, but very effective in design, is employed by the production department of a company in the West Texas

area. Built entirely of sucker rod material, and very little of that, the gate is strong and is equipped with a positive latch also of simple design.

The gate is easily laid out and welded together by the company welder. The latch, a piece of sucker rod bent double, then bent into an "L" shape as indicated, is designed so that it will just straddle the top member of the gate, effectively preventing the gate from swinging in either direction. With this type of latch there is less likelihood of range animals accidentally opening the gate to enter the well area.

HOW TO—
Tighten Fence With Turnbuckle System

A company operating in the West Texas area has a particularly efficient method of keeping its fences in good repair. A vertical length of sucker rod,



set up at a point about 12 to 18 inches from the corner post, is connected to the post by a series of five turnbuckles, by which the fence is pulled up evenly and tightly. The sucker rod is dropped through the rings of the several turnbuckles, and attached to the individual strands of the fence. The hook ends of the turnbuckles are then secured to rings welded to the side of the well-braced corner post to complete the juncture.

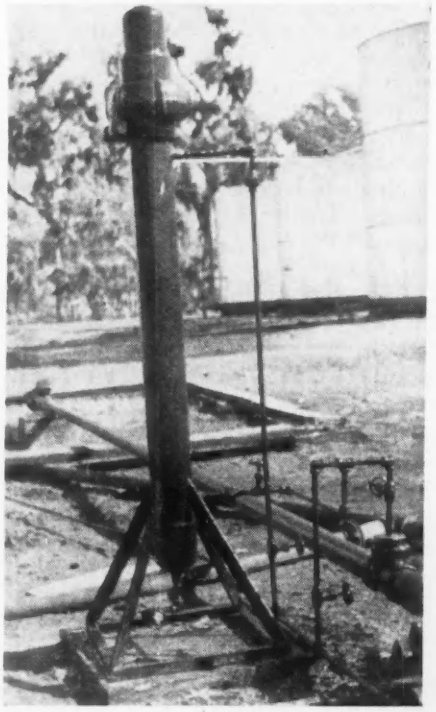
This turnbuckle system not only facilitates installing the fence panels, but allows easy periodic adjusting and tightening of the fence. It is economical, neat, almost entirely salvageable and of such a design that any panel of the fence can be unhooked and laid aside.

PREVENT
Internal
Corrosion!
WITH
"TK-2"
THERMO-SETTING
BAKED-ON PLASTIC COATING
Tube-Kote . . . Largest Applicators and Formulators of Quality Baked-On Coatings to Prevent Corrosion In The Oil & Chemical Industries.
See You at NACE CONVENTION Galveston Mar. 10-14 Booth 28
TUBE-KOTE
TUBE-KOTE
First Name In Corrosion Resistance
2520 HOLMES RD.
P. O. BOX 20037
HOUSTON 25, TEXAS
Write-Phone or Wire for Technical Service Information

HOW TO—Scrub Gas Supply Used in Chemical Pump

Where the gas supply for the chemical feed pump is obtained from the vent line of the separator, it is necessary to have the gas as clean as possible to keep the pump motor in good working order. One company uses a scrubber composed of a section of 5-3/16 inch pipe stuffed with waste rag or other filtering medium.

One end of the vessel is swaged down to half-inch and a valve is installed for a drain. The other end is closed by a bull plug and a quick acting union so that the entire end of the chamber may be removed and the filtering material replaced.

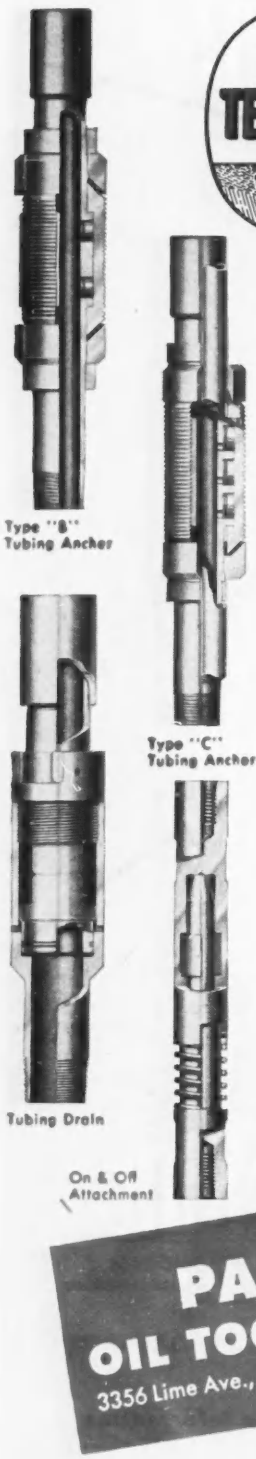


Discharge connections are made near the top and at the inlet at the bottom of the chamber so that the gas must pass upward through the filtering medium. The other quarter-inch connections shown are used as bypasses to keep the chemical pump in operation while the filter is being serviced.

A stand was made of short pieces of angle iron. After a base was made, uprights were welded to the side of the container to hold the drain cock off of the ground.

A small concrete slab supports the scrubber so that it will not sink or break off the small connections.

After these devices were installed on the pressure line leading to the chemical pumps, a decrease was noted in the down time of the pumps. The installation resulted in less repair expense and cleaner crude.



PAGE TENSION TOOLS

PAGE

TENSION TYPE

PRODUCTION TOOLS
at your
D + B and CONTINENTAL SUPPLY STORES

PAGE "TENSION TYPE" Production Tools—Tubing Anchors, Tubing Drains, and Sucker Rod On & Off Attachments—are available in the Mid-Continent through your nearest D+B and Continental Supply Stores. Check these new Tools. Get the *full* story on how *Page* Tools can cut production costs by keeping tubing in the hole longer!

PAGE TOOLS ARE *different*

TYPE "B" ANCHOR for ROD PUMP STRINGS: Page Type "B" Tubing Anchors set hydrostatically as the well pumps up!

TYPE "C" ANCHOR for MAIN AND PARALLEL STRINGS: Page Type "C" Tubing Anchors embody the same operation advantages as the Type "B" *plus* a special design for anchoring *both* main and parallel strings!

DRAIN AND BUMPER SUB COMBINED: Page Combination Tubing Drain and Bumper Sub affords a means of draining the tubing above the pump and can also be used as an effective up-jar!

ON & OFF ATTACHMENT for SUCKER RODS: Page's unique On & Off Attachment joins sucker rods to pump *after* tubing run-in—releases quick whenever desired!

FIELD RECORDS PROVE . . .

. . . that anchoring the Page Way *increases* pump efficiency and *decreases* equipment wear —visit your nearest D+B Pump Store or Continental Supply Store – find out how Page "Tension Type" Tools can help *you!*

Mid-Continent Distributors

D+B Division—Emsco Derrick & Equipment Co., Garland, Texas

The Continental Supply Company Dallas, Texas

PAGE OIL TOOLS, Inc.
3356 Lime Ave., Long Beach 7, Calif.

When SAND Is Your Problem Let **LAYNE** GRAVEL PACK Your Well

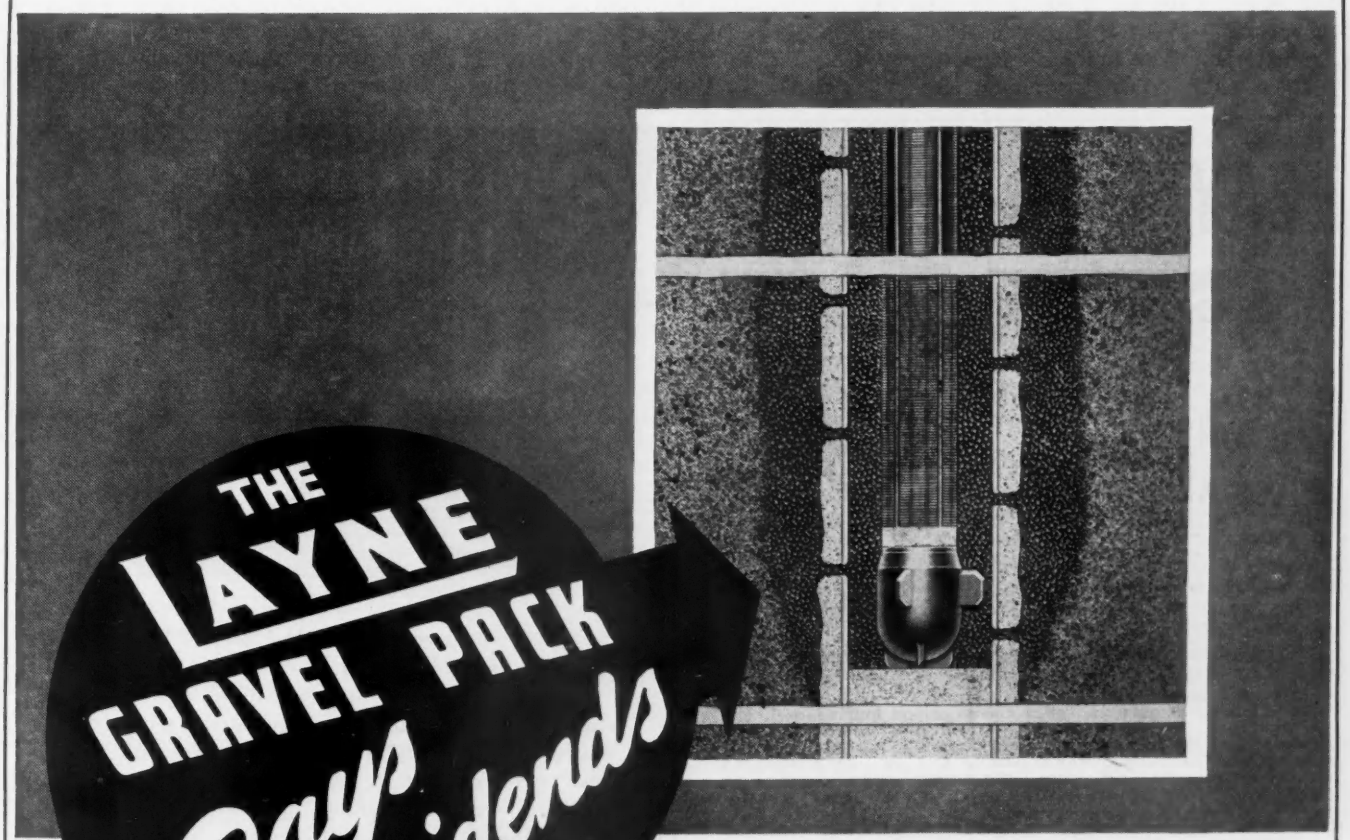
More and more Producers are finding "Gravel Pack" the answer to their most difficult sand problems—when it is done *RIGHT*.

The Layne & Bowler Company has the "KNOW HOW" at every depth.

Because the Gravel Pack can neither deteriorate nor enter the screen and because it permanently supports the formation and filters the flow, you are not confronted with the frequent expense of pulling tubing to replace sanded up screen and sand cut parts and other expenses involved in reworking wells.

Gravel Packing controls the productive sands. It surrounds the strainer with a natural filter, coarse enough for the oil to flow through, yet fine enough to retain the oil sand in its natural state of formation. Acting as a baffle, the gravel distributes the flow through the countless channels, lowering the velocity and preventing disruption of the fine grains of sand resulting in longer life for the well and equipment.

For longer, more constant flow of clean oil—let Layne & Bowler Gravel Pack your well.



Write

THE LAYNE AND BOWLER CO.

EXPORT:
Jeff Tucker
Room 1636
30 Rockefeller Plaza
New York, N. Y.

General Office & Factory
8000 MARKET STREET
HOUSTON, TEXAS

WEST COAST:
Layne & Bowler Corp.
900 Santa Fe Ave.
Los Angeles, Cal.

HOW TO—

Mount Water Can On Tractor Unit

Instead of carrying a water can on the tool wagon trailer where it becomes dirty, bent or turned over, or placing it on the ground where it may be run over by trucks, an operator devised a holder of old tank straps and mounted the cold water can on the tractor pulling unit. There is nothing unusual about the metal holder except that it is made of heavy steel that will prevent the water cooler from being bent.

Field men who have used water coolers of the type that is not equipped with spigots, know that water is spilled on the ground when pouring, and when the can is full, it is rather difficult to fill a cup or the lid due to the conical shape of the neck. However, the manner in which this water can holder is mounted overcomes many of these disadvantages.

The circular can holder is attached to the rear of the tractor pulling unit

by means of two horizontal arms welded to the tractor frame just below the operator's seat. These two arms are hinged to short extension tabs welded to opposite sides of the upper ring of the can holder as shown. To facilitate tipping the can when pouring water into a cup or into the lid of the can, an extension handle welded to one side of the holder extends about 20 inches above the top of the holder. With the resulting leverage, it is not difficult to tip the assembly when the can is full of water and ice. The water cooler may easily be inserted or removed from the holder.

HOW TO—

Use Blackboard as Aid to Operations

Use of a small blackboard on which messages can be written is helping to improve over-all lease efficiency for some Canadian producers whose crude oil has to be trucked out pending the laying of pipe lines into their fields.

At each tank battery, conveniently near the tank outlets, a steel pipe post is set in the ground and on this is mounted a small sheet steel box with a sloping front in which paper, chalk and miscellaneous records may be stored temporarily. Below the receptacle is a rectangular blackboard on which the lease foreman or superintendent can write messages for the drivers of the oil trucking company

BEAVER 26-R

the only tool of its kind that . .

. . . cuts either standard "taper" or electric "straight" conduit threads by a simple adjustment.
. . . has "radio" dial size-setting. Dies can be removed in a few seconds FROM THE OUTSIDE without use of tools.
. . . is fully-adjustable and easy-working. The only 1 to 2-inch pipe threader that cuts standard, oversize and undersize threads of uniform standard length.

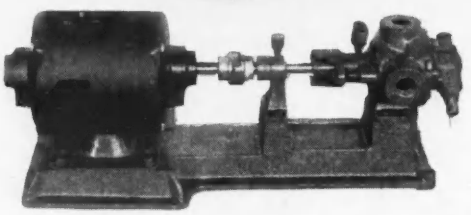
The Beaver 26-R uses one set of dies to thread four sizes—1, 1¼, 1½ and 2-inch. It is fully-adjustable for oversize or undersize threads to compensate for variation in fittings. There's a cam-type universal self-centering chuck, too, which centers the pipe accurately and insures straight pipe lines. Yet, "drip threads" may be cut when desired for heating lines. Available at all leading supply houses—don't accept substitutes. Competitive in price!

SEND FOR BEAVER CATALOG NO. 51. Address Beaver Pipe Tools, Inc., 254-300 Dana Avenue, Warren, Ohio, U. S. A.

BEAVER PIPE TOOLS

254-300 DANA AVENUE WARREN, OHIO, U. S. A.

DEPENDABLE POWER for PUMPING by VIKING



Viking Pumps are among the leaders for efficient service to the Oil Industry.

Southern Engine Pumping Units are carefully engineered for your job. Our service, competent mechanics, complete stocks and 42 years of "know how" are available to you.

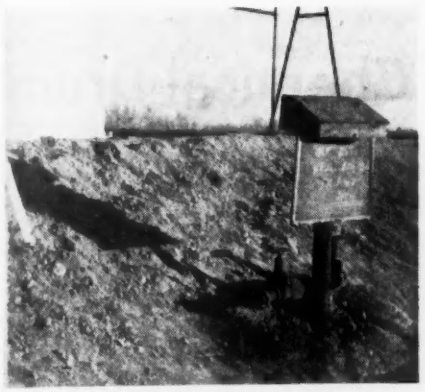
We invite your inquiries.

Distributor

SOUTHERN ENGINE & PUMP COMPANY

MANUFACTURERS • MACHINERY FACTORS • CONTRACTORS

Houston — Dallas — Kilgore — San Antonio
Edinburg — Corpus Christi, Texas



operating in that lease or part of the field, advising which tanks are ready to be shipped out.

Mounting the blackboard beneath the overhanking desk-like box protects it from the washing action of rains.

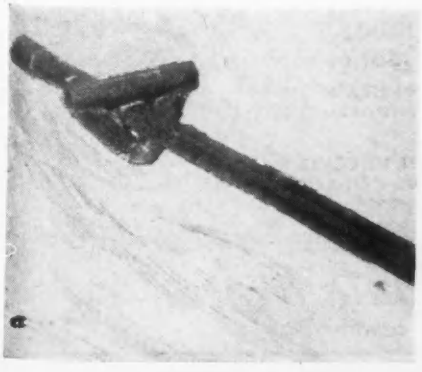
HOW TO—

Fabricate Anchor For Blowdown Line

Illustrated is a simple method used to anchor the end of a well or trap blow-down line, which, when the line is taken up, permits the anchor itself to be salvaged for re-use elsewhere.

Made of two-inch pipe, the anchor consists of two crossed legs welded together at the point of contact and further secured at the top by a 12-inch cross member of similar size pipe. The point of contact of the two legs is determined by the diameter of the blow-down line. The assembly is laid out on a floor and the opening determined exactly before bevelling the top ends of the pipe and welding on the cross piece.

Length of the legs below the point of crossing may be established after determining the nature of the soil and the general type of service to which the unit will be subjected.



Eliminate

COSTLY STRIPPING JOBS

MADE NECESSARY BECAUSE OF PARAFFIN ACCUMULATIONS

CRALL Spiral Paraffin Scrapers are the Answer

CRALL Spiral Paraffin Scrapers have been installed in wells that required paraffin removal every ten days. After many months of continuous operation, after scrapers were installed, the wells still maintained normal production. This is a record that can't be ignored.

Check these features and prove for yourself that CRALL Spiral Scrapers cost you nothing in the long run. Many times they have paid for themselves in less than two months.

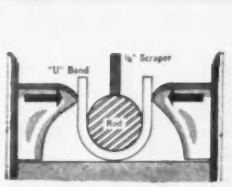
PASS SCRAPERS EVERY STROKE UP AND DOWN

Scrapers alternate — one right, one left — eliminating tendency of the rod to unscrew.

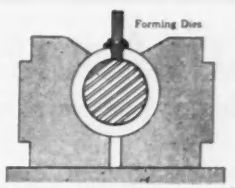
Scrapers are attached at our own plants under our personal supervision, and stocked at supply stores.

No maintenance costs. Practical, economical and adaptable to ANY pumping well.

Made of thick, mild steel. Sizes to fit 2" and 2½" tubing regardless of size sucker rod.



Cross section showing "U" band being die-formed around rod to the scraper blade.



Cross section showing band held under pressure around rod while ends of band are shrink-grip attached to scraper blade.

The original installation is the only cost. Order your CRALL Spiral Scrapered rods from your supply store or wire, write or phone . . .

PETROLEUM SPECIALTY CO.

P. O. BOX 1640 PAMPA, TEXAS

Manufacturing, Fabricating Plants and Sales Offices

Pampa, Sundown and Odessa, Texas — Casper, Wyoming — Oklahoma City and Chickasha, Okla.

Out

Go Rust and Scale
from ALL
Radiator Cooling Systems
When In Goes

SAND-BANUM SPECIAL
Pure Concentrated Tablets

SAFE IN USE
CERTAIN IN ACTION

For the Same
Results in
BOILERS
Use Ounces Only
Once a Week
of

SAND-BANUM
Pure Colloidal Concentrate

Send for
New Edition of
"THE SAND-BANUM STORY"

A Practical Treatise On
A Vital Subject.

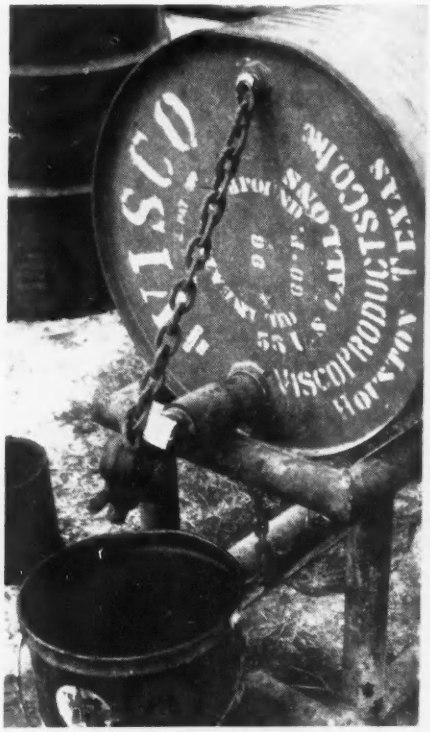
SAND-BANUM PRODUCTS ARE
Stocked by
Leading Supply Houses

AMERICAN SAND-BANUM CO.
Established 1926
9 Rockefeller Plaza
New York 20, N.Y.

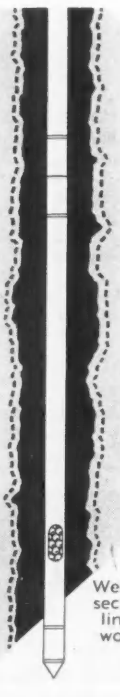
HOW TO—Safeguard Chemical Drum

To eliminate theft of chemicals used on remote leases, one pumper rigged a positive locking system that is both fool-proof and simple in design. Not only the breather plug, but also the dispensing valve is locked.

The drum of chemical was placed on a simple pipe frame rack as illustrated, so that it lay in a horizontal position. The drain bung was positioned on bottom so the contents would drain through a two-inch connection. Five gallon cans were used to refill small chemical pumps which forced the liquid into the flow line upstream of the separators. A short nipple of 2-inch pipe was screwed into the drum and a collar added. A quick-opening dispensing valve was screwed into the collar to complete the drain line. The dispensing valve was equipped with a hasp to be used in locking the valve closed.



To secure the breather plug at the same time the quick-opening valve was locked, a short section of ⅜-inch chain was used. The end of the chain was welded to the breather plug as shown, and the chain was just long enough so that one of the metal segments could be hooked through the lock which was inserted in the hasp of the valve. By screwing the breather plug tight, and locking the chain to the valve, neither the breather plug could be unscrewed nor the drain line removed. The lock prevented the valve from being opened.



Well bore cross section. Dotted lines indicate wall reaming.

Clean Out Congested Wells

WITH BURCH AGATE TORPEDOES

Marble blasting pays because marble abrasion is thousands of times greater than sand blasting. It frees oil and gas in the well bore by removing all retarding substances from the true pay formation.

- CONDITIONS A WELL BORE OR SHOT HOLE BY RESTORING NATURAL FORMATION.
- ABRASION REAMING THE WALL CONTOUR DEEPER THAN RETARDMENT.
- EXPLOSIVE-DRIVEN GLASS MARBLES STRIKE THE WALLS WHOLE AND IN A UNIFORM PATTERN.
- 242 PER LINEAL FOOT OF HOLE.
- EACH MARBLE PENETRATES THE WALL SURFACE AND THEN BURSTS EXPLOSIVELY.
- DESIRED COLUMN TO COVER PAY IN ONE RUNNING CAN BE MADE WITH 5' SECTIONS.

Cross section view of torpedo

SIMPLE • IMMEDIATE • ECONOMICAL

BURCH *Agate Torpedo*

CALL YOUR OWN SHOOTER

BORGER, TEXAS

U.S. Pipe Lines

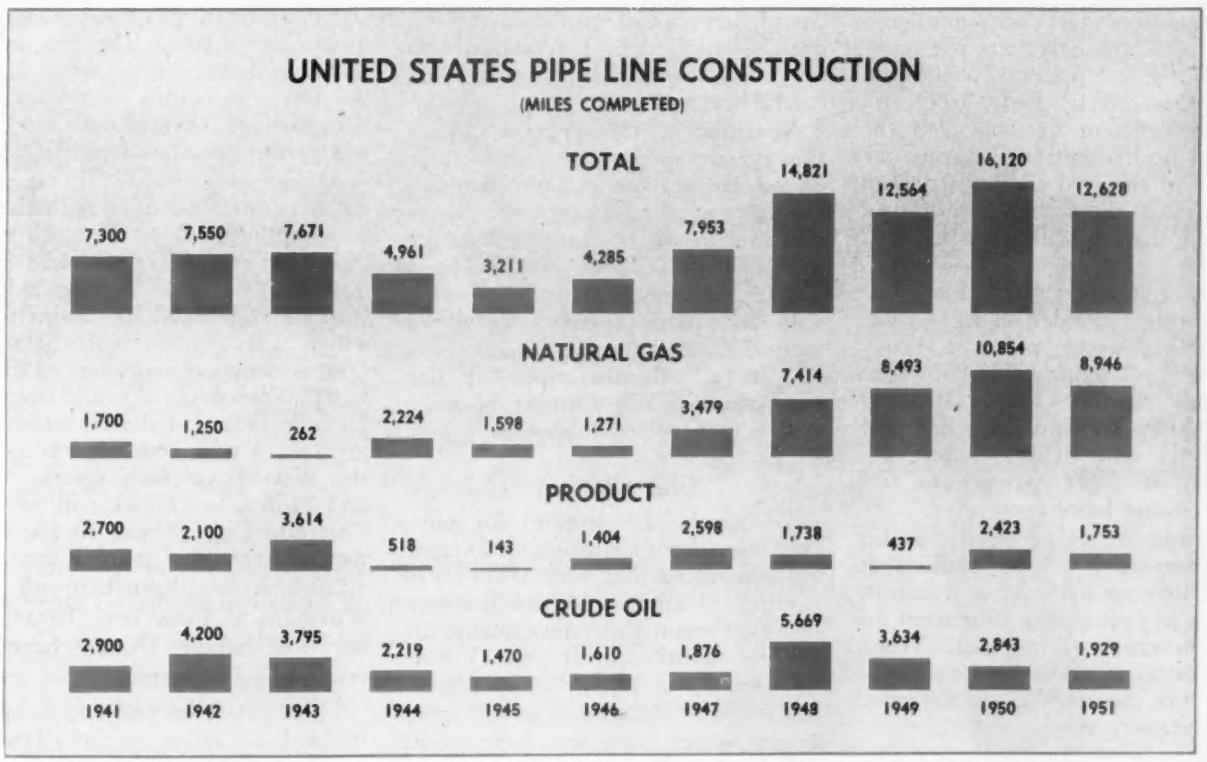
to be Hampered Again by Steel Scarcity

By DONALD M. TAYLOR, *World Oil Staff*

ANOTHER year of widespread pipe line construction is ahead for the U. S. in 1952, although steel shortages will delay completion of many projects now planned or authorized.

During the past year, a total of 12,628 miles of new pipe lines were placed in operation. Of the total, 8946 miles were gas transmission lines, 1929 miles were crude carriers and 1753 miles were products lines.

This 1951 total fell below forecasts of one year ago. At that time, more than 32,000 miles of pipe lines had been announced as planned, authorized or under way. Pipe line construction was seemingly on an upward spiral. But, as steel supplies dwindled, the inability to obtain all the line pipe desired caused reduction in the number of miles of new transmission systems placed in operation during the year. As the chart shows, the 12,-



YEAR	MILES OF NEW PIPE LINE PLACED IN OPERATION*				MILES OF LINE BUILDING OR AUTHORIZED AT YEAR END†			
	Oil	Product	Gas	Total	Oil	Product	Gas	Total
1951.....	1,929	1,753	8,946	12,628	7,182	4,368	18,473	30,023
1950.....	2,843	2,423	10,854	16,120	5,366	3,288	23,934	32,588
1949.....	3,634	437	8,493	12,564	2,663	2,055	21,740	26,499
1948.....	5,669	1,738	7,414	14,821	4,779	42	15,323	20,144
1947.....	1,876	2,598	3,479	7,953	2,715	1,386	9,790	13,891
1946.....	1,610	1,404	1,271	4,285	2,099	2,638	4,771	9,508
1945.....	1,470	143	1,598	3,211	831	882	248	1,961
1944.....	2,219	518	2,224	4,961	112	....	286	398
1943.....	3,795	3,614	262	7,671	848	....	1,423	2,371
1942.....	4,200	2,100	1,250	7,550	1,147	428	140	1,715
1941.....	2,900	2,700	1,700	7,300	322	....	446	768
1940.....	1,615	575	810	8,000	457	450	243	1,150
1939.....	3,155	840	305	4,300	460	589	171	1,220

* Includes all lines completed during the year. † Mileage on all types of pipe lines on which construction was still underway at end of year, plus mileage of new lines authorized or planned.

628 miles of lines placed in operation in 1951 compare with 16,120 miles in 1950, 12,564 miles in 1949, and 14,821 miles in 1948.

Today, Washington holds the key to the number of miles of pipe line to be added this year to the 460,000-mile network of lines which now criss-cross the U. S. Since steel is the prime factor and since the steel allocations likely will follow the pattern established in the last half of 1951, this year's outlook is for completion of about the same number of miles of pipe line.

WORLD OIL's forecast is for slightly more than 13,000 miles for the year. Were it not for the steel shortage, the total would far exceed this figure.

Hindsight

Two unrelated factors acted to curtail the number of miles of pipe line placed in operation during 1951. The first, a shortage of steel for line pipe, caused many projects not considered vital to the defense effort to wither on the vine. Even projects authorized and encouraged by PAD, FPC and other government agencies, felt the effect of insufficient steel during the last half of the year. For this reason, completion of many lines was delayed and their length will show in 1952 totals.

Many companies, foreseeing line pipe shortage, decided to forego line construction which places a heavy drain on steel tonnage, and to "skin the cat" another way. Designers added horsepower instead of line pipe to gain the same delivery capacity—although at slight sacrifice to fuel efficiency and labor cost.

For example, one company added three temporary booster stations at points along an inadequate transmission line to gain almost 40 percent increase in crude throughput. When pipe becomes available, necessary pipe lines will be constructed and the extra booster stations dismantled.

Common sense was the second factor contributing to pace slacking in the cross country pipe line race. Many companies and contractors simply agreed not to construct pipe lines during winter months. Acknowledging their inability to master weather and withdrawing from the battle of mud, snow and rain, contractors postponed completion of a number of projects and shaved mileage totals for pipe lines placed in operation in 1951. But it made good sense.

Many pipe line contractors and company officials have learned the bitter lesson of penalties, which, more often than not, are the result of "get-

Pipe Sizes of Lines Laid in U. S. During 1951 and 1950

Nominal Pipe Size (Inches)	Miles Completed		Percent of Year's Total	
	1951	1950	1951	1950
4	518	365	4.10	2.26
6	1,219	978	9.65	6.07
8	1,124	1,335	8.90	8.28
10	1,265	860	10.02	5.34
12	893	2,884	7.07	17.89
14	485	285	3.84	1.77
16	817	676	6.47	4.19
18	546	1,278	4.32	7.93
20	1,374	1,391	10.88	8.63
22	50	832	0.40	5.16
24	1,446	209	11.45	1.30
26	1,270	1,488	10.06	9.23
30 and Over	1,621	3,539	12.84	21.95
	12,628	16,120	100.00	100.00

'er-in-or-else" construction programs carried out under adverse weather and ground conditions. Equipment mires down, damaging itself and delaying the job; labor costs rise; pipe coating is inferior; right-of-way and off-right-of-way damage claims soar. Neither contractor nor company benefits from pressing construction to completion regardless of weather conditions, unless delivery commitments are inflexible and the project is an emergency measure.

November, 1951, saw many spreads shut down and equipment in storage, because contractor and company decided not to undertake greater expansion than could be completed before winter set in.

With finances and markets available and plans already drawn for more than 30,000 miles of main lines and loops, only the supply of line pipe can limit the number of miles of line constructed this year.

Steel Allotment

To supply the demand for pipe, Petroleum Administration for Defense has announced that 1,560,000 tons of steel will be allotted for pipe line construction and maintenance during the first six months of the year. Unfortunately, PAD allotment carries no guarantee of delivery. The statement of aim, which decreases by 6 percent the 1951 total for the same period, does not mean that this exact total steel tonnage will be readily available to the industry. Even government officials can foresee a rough and tumble scramble growing out of efforts to obtain full allotments of steel. In fact, requests for revalidation of 1951 steel tonnage have already bitten into 1952 allotments.

Thus, the steel shortage will continue to plague the industry, and the pace of pipe line construction will follow line pipe delivery schedules. The over-all picture closely resembles 1951, and barring an all-out war great cutback in defense spending, the total miles of pipe line placed in operation will be close to that of the previous year.

Crude Lines

There will be a strong upsurge in construction of crude oil pipe lines in 1952—the total will likely exceed 4500 miles at the year's end. Last year fewer than 2000 miles of new crude lines were placed in service, yet PAD has already approved steel allotments for more than 2800 and now is considering requests for many more miles of line.

A program of crude oil and products lines has been given high priority, and construction of them will move ahead at a rapid clip—even at expense of gas transmission lines if necessary. For the first six months, PAD has allotted 867,950 tons of steel for construction of crude oil and products pipe lines, compared with 692,550 tons for gas transmission and distribution systems. This is a reversal of the policy last year, when, during the last six months, gas lines were allocated 349,000 tons more steel than was permitted oil and products lines.

Almost all crude oil pipe line activity centers on tying refineries and shipping terminals to the vast reserves of oil recently discovered and developed in West Texas. For example, the Rancho 477-mile-long 24-inch line, which will soon be under construction, is designed to transport 209,000 to 315,000 barrels of crude from McCamey, Texas, to the Houston refining area. Under construction today is the West Texas Gulf system of 26- and 24-inch line which will run from Colorado City, Texas, to the Beaumont-Port Arthur refining area, with a 20-inch line branching off from Wortham to Longview, Texas. This line will handle 300,000 barrels of crude every 24 hours.

Other crude lines of lesser capacity to be built from western Texas to refining areas are Continental Pipe Line Company's 225-mile 12-inch line from Wichita Falls to Ponca City, Oklahoma, and Texas Pipe Line Company's 195-mile 16-inch line from Corsicana to East Houston, Texas.

South Louisiana crude will move to Houston refineries via Texas Pipe Line Company's 22-inch line to be constructed from Houma, La., and almost 100,000 additional barrels per day of Louisiana crude will flow to the refinery at Baton Rouge when Interstate Oil Pipe Line Company's 1952 expansion program is complete.

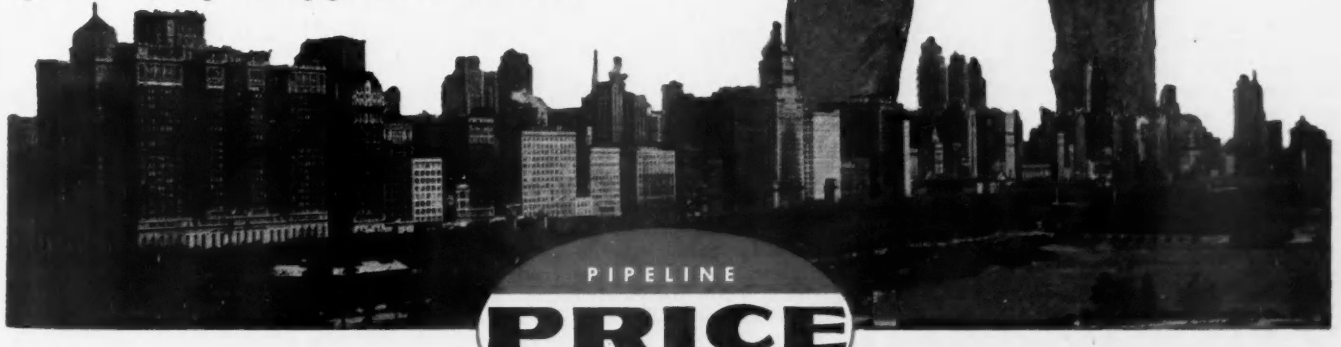
An expansion of equal intensity is

CHICAGO IS COOKING WITH

More Gas...

Now that our job is finished!

Congratulations to the Texas Illinois Natural Gas Pipeline Company on the inauguration of their new 30-inch line from Corpus Christi, Texas, to Joliet, Illinois. The Chicago area is now receiving almost double the gas supply than before the line was finished. H. C. Price Co. is proud to have had a part in this important pipe line achievement.



PIPELINE

PRICE

CONSTRUCTORS

BARTLESVILLE PHILADELPHIA • NEW ORLEANS

America's Foremost Pipeline Constructors

SOMASTIC AND HEVICOTE PIPE COATING

shaping up in rich Canadian oil fields. Trans Mountain Oil Pipe Line Company has contracted for a 791-mile-long 24-inch line to run from Edmonton, Alberta, to Vancouver, British Columbia. Work on the project will start about June 1.

The race to tap Williston Basin crude sources will start when the extent of reserves has been determined. Service Pipe Line Company has made the first move in what will likely grow into a chain reaction by constructing a short gathering system which will serve to collect oil for rail shipment.

Products Lines

Today, almost any bona fide proposal for constructing a products system from a refining area to industrial, shipping or defense center will be met with warm PAD support — an outgrowth of sound defense planning. In case of war, any system of offense or defense must depend heavily on having aviation truck and motor fuels readily available at strategic points.

Adding even greater impetus to products lines planning is the revelation that products systems have proved profitable — from the standpoints of high earnings (enhanced by improved methods of minimizing leakage and evaporation losses) and also of enabling shippers to place refined products in market areas for less money than rail fare. A close look at products systems shows that almost all of them have been expanding or planning expansion in recent years.

This year will likely set a record for products line expansion. More than 1500 miles of lines have already received Washington approval and plans for construction of other systems are being rushed to completion. Several systems now on drafting tables will exceed 1000 miles. One or more of the long lines will likely be approved in the near future.

Gas Transmission Lines

Gas systems will continue to expand, although the races for new franchise territories are almost over. Except for the Pacific Northwest, almost all areas of the U. S. supporting heavy industries are served with gas. Expansion, as president of one gas company described it, will be along lines of developing markets in depth.

This is the purpose of most applications before FPC today. Great emphasis is placed on looping existing lines to increase capacity and to develop underground storage areas near markets to take care of heavy winter demands. Over $100 million will be spent this year in developing underground storage in Ohio, Illinois, Indiana and Pennsylvania.

A hearing to determine which of four gas companies will serve the Pacific Northwest is scheduled for FPC hearing in April. Also scheduled in the near future is an FPC hearing of the Texas-Ohio Gas Company's plan to bring gas from lower Rio Grande and Mexico to the markets in West Virginia.

Crude, Products and Gas Lines Planned in 1952

Crude

CONTINENTAL PIPE LINE COMPANY, Ponca City, Okla.

Texas and Oklahoma: PAD approved 225 miles of 12-inch line from Wichita Falls, Texas, to Ponca City, Okla. The line will carry approximately 40,000 barrels per day of crude from Throckmorton, Montague, Clay, Archer, Young and Wichita counties. Estimated cost is $5,900,000.

South Texas: PAD has approved 100 miles of 8-inch line to reach from Rincon field in Starr County to Port Isabel, Texas, near the mouth of the Rio Grande river. Capacity of the line will be about 17,000 barrels daily. Cost is estimated at $2 million. Rice Institute, Houston, is a 50 percent partner in the project.

HUMBLE PIPE LINE COMPANY

West Texas: Company plans 30 miles of 12-inch to start at Pembrook field in Upton County and run to Kemper station in Reagan County. Capacity will be 60,000 barrels daily.

INTERSTATE OIL PIPE LINE COMPANY, Shreveport.

Louisiana: Over-all expansion plan of the company is aimed at (1) increasing capacity of its South Louisiana system to 55,000 barrels per day; (2) modernizing Bunkie-Melville section of main line from Shreveport to Baton Rouge; and (3) increasing capacity of Southwest Louisiana system to 80,000 barrels per day. Plans call for construction of 32 miles of 20-inch line between Bunkie and Melville and installation of a 12-inch Atchafalaya River crossing. On the South Louisiana system, 68 miles of 16-inch line will be contracted to replace an existing 6- and 8-inch line. Construction is planned for early summer and completion for fall. Expansion of the Southwest system calls for 55 miles of 16-inch between Sunset and Anchorage to replace existing 8- and 10-inch line, and 23 miles of 12-inch between New Iberia and Bayou Sale to replace existing 6-inch line. A new 1200-hp pump station will be erected in vicinity of New Iberia.

THE OHIO OIL COMPANY, Findlay, Ohio.

Medicine Bow, Wyo.: Wyoming Public Service Commission approved 5 miles of 4-inch line.

PAN AMERICAN PIPE LINE COMPANY

West Texas: Company plans to build 15 miles of pipe line from Hulldale field, Schleicher County, to tie to proposed Rancho system from McCamey to Houston.

PROGRESS PACIFIC PIPE LINE COMPANY

Texas to California: Company is seeking PAD approval of a 1050-mile 24-inch crude line from West Texas to Long Beach, Calif., paralleled by a 10-inch products line. Capacity of the crude line would be 250,000 barrels per day. Estimated cost is $120 million.

RANCHO PIPE LINE SYSTEM

West Texas to Houston: PAD has approved the 477-mile, 24-inch line from McCamey, Upton County, West Texas, to Deer Park, Harris County, Texas. Shell Pipe Line Corporation will construct and operate the line which will be owned jointly by Sinclair Pipe Line Company, Pan American Pipe Line Company, Phillips Pipe Line Company, Nantucket Pipe Line Company, and Tide Water Pipe Line Company. At Genoa, near its southern terminus, Rancho will connect with a line running to Texas City for Pan American. At Deer Park, it will connect with the refineries or terminals of the other owners. Completion is scheduled for late 1952. Estimated cost of the 209,000 to 315,000-barrel-per-day-line is $35 million.

SERVICE PIPE LINE COMPANY, Tulsa.

Kansas and Missouri: 19 miles of 16-inch will be laid between Kansas City and Sugar Creek, Mo.; 2 miles of 12-inch will be laid from Neodesha, Kansas, to the company's main line system.

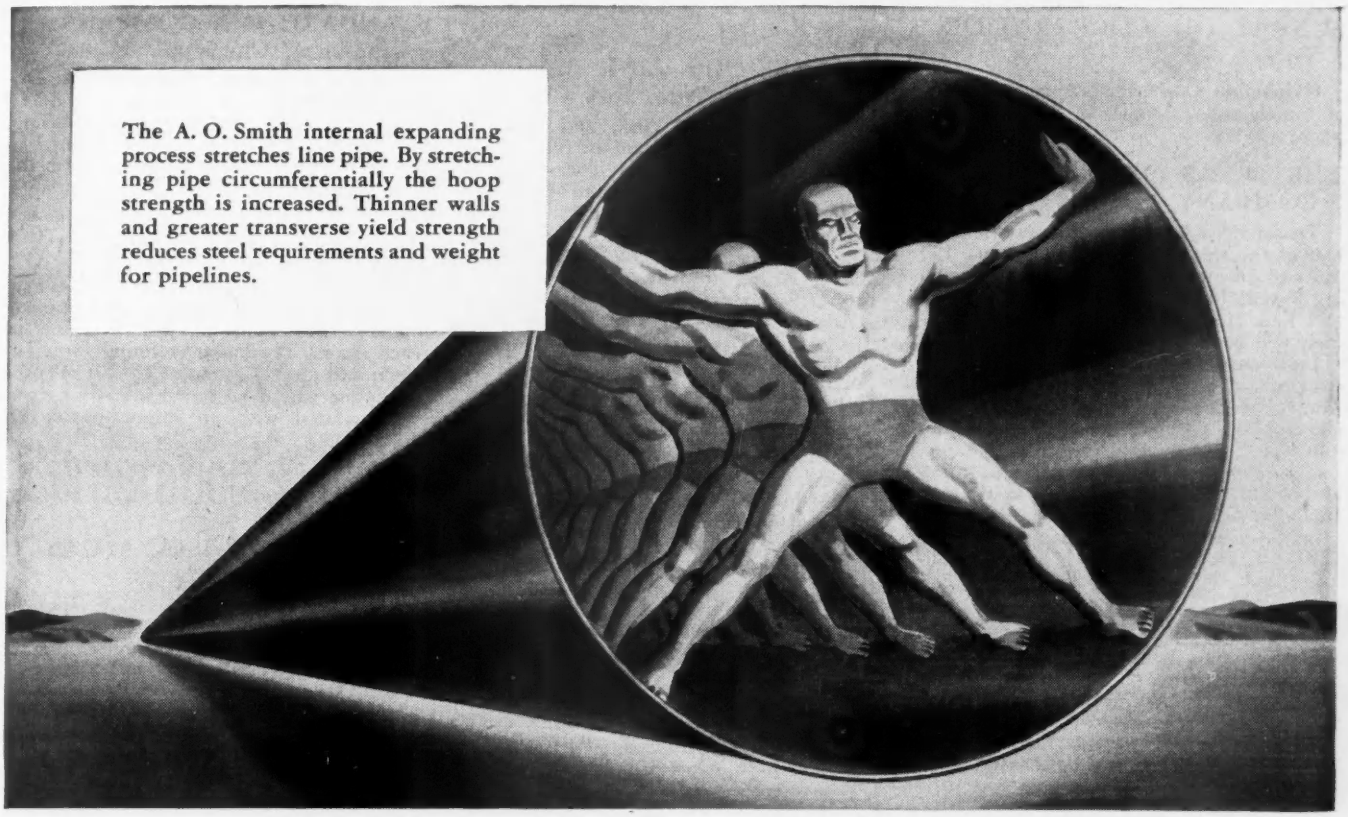
SHELL PIPE LINE CORPORATION

Texas: Company plans 66 miles of 8-inch from Gohlke field in DeWitt County to La Grange area. Line will supply 15,000 barrels of crude daily for Shell's refinery at Houston. Cost is estimated at $2½ million.

SINCLAIR PIPE LINE COMPANY, Independence, Kas.

Oklahoma to Indiana: PAD has allotted 40,000 tons of steel to be used in construction of 675-mile 22- and 24-inch pipe line system from Drumright, Okla., to East Chicago, Ind. The line will be 24-inch to Salisbury, Mo., where it will reduce to 22-inch. O. R. Burden Construction Corporation, Tulsa, has a contract

FIRST names in pipelines depend on the FIRST* name in line pipe


The A. O. Smith internal expanding process stretches line pipe. By stretching pipe circumferentially the hoop strength is increased. Thinner walls and greater transverse yield strength reduces steel requirements and weight for pipelines.

We increase line-pipe Strength and Save Steel

The internal expanding of line pipe is a proven process at A. O. Smith Corporation. It has been used on SMITHway Line Pipe since 1930.

This stretches the pipe, increasing the circumferential yield strength as much as 30%. Lighter wall pipe can be used for the same operating conditions. Material savings in steel, freight, and field welding costs are obtained.

In these days of restrictions on the use of critical materials, of which steel is basic, the A. O. Smith internal expanding process, which assures uniformity of SMITHway Line Pipe, reduces the tonnage of steel required for any given pipe line.

Through its application of new and sound engineering design and developments in the manufacture of large diameter pipe, A. O. Smith is recognized as the leader in this field.

* FIRSTS by A. O. Smith • Welded line pipe • Internal expanded pipe • Light wall large diameter pipe • World's largest producer of large diameter welded steel pipe.

A.O. Smith 78th ANNIVERSARY 1874 · 1952

DEPENDABILITY *through* **RESEARCH** *and* **ENGINEERING**

A.O.Smith

LINE PIPE • CASING

Chicago 4 • Dallas 2 • Denver 2 • Houston 2
Los Angeles 22 • Midland 5, Texas
New Orleans • New York 17 • Pittsburgh 19
San Francisco 4 • Seattle 1 • International Division: P.O. Box 2023, Milwaukee 1

for 154 miles of the line between Drumright and Humboldt, Kansas.

SUNRAY OIL CORPORATION, Tulsa

Oklahoma: Gathering system, 3.5 miles of 4-inch and 3.0 miles of 5-inch in Stephens County.

THE TEXAS PIPE LINE COMPANY, Houston.

Texas: PAD has allocated approximately half of the steel required to construct 195 miles of 16-inch pipe line to replace existing 8- and 10-inch line between Corsicana and East Houston, Texas. The 8- and 10-inch will be salvaged.

Louisiana and Texas: With virtually all steel allotted for construction, Houston Contracting Company, Houston, will start about March 1st on construction of 220 miles of 22-inch pipe line from Houma, La., to Port Arthur, Texas, and 31 miles of 12-inch from Cocodrie, La., to Houma. Included in the job will be 60 miles of 6- to 10-inch gathering system in Bay St. Elaine, Lake Barre, Lake Pelto and Caillou Island fields in the Terrebonne Bay area.

TEXAS-EMPIRE PIPE LINE COMPANY.

Illinois: PAD has approved construction of 30 miles of 18-inch pipe line to be laid from Wilmington, Ill., to Lockport, Ill. Construction will start in August, 1952.

TEXAS-NEW MEXICO PIPE LINE COMPANY.

West Texas: Company plans to build total of 75 miles of 8-inch lines. One will run from Midland to Germania pool; one from Midland to Scharbauer and Sweetie Peck areas; and the third from the company's Crane station to new production in the McElroy area.

New Mexico: Company plans to build 55 miles of 8-inch from Eunice, N. M., to Lovington and Saunders areas, Lea County, N. M.

WEST TEXAS GULF PIPE LINE COMPANY.

West Texas to East Texas Gulf: 372 miles of 26- and 24-inch crude line to run from Colorado City to Beaumont, Texas, and 114 miles of 20-inch to run from Wortham to Longview, Texas. The section of line from Colorado City to Wortham will be 26 inches in diameter and capable of delivering 300,000 barrels of crude every 24 hours. At Wortham, where the 20-inch Longview line will tie in, the main line will reduce to 24-inch in the extension to Beaumont-Port Arthur refining area. Total length of the main line is 466 miles, of which 94 miles is now under contract. (See Contracted and Under Way Section.) PAD has allotted 58,000 of the 130,000 tons of steel required to construct line which is scheduled for September, 1952, completion.

This line, to cost about $39 million, will be jointly owned by Gulf Oil Corporation, The Pure Oil Company, Cities Service Company, Sun Oil Company and Standard Oil Company of Ohio.

Products

BELL OIL AND GAS COMPANY, Tulsa.

Oklahoma: PAD has allotted approximately one-half the steel required to build a 150-mile 6- and 8-inch line from Ardmore to Drumright, Okla. Initial capacity of the line will be about 9000 barrels per day.

BUCKEYE PIPE LINE COMPANY, New York City.

New Jersey, New York, and Pennsylvania: In the first quarter of 1952, PAD has allotted approximately one-third of steel required to complete the 430 miles of products lines. The entire line, scheduled for third quarter, 1952, completion, will include 75 miles of 14-inch from Linden, N. J., to Allentown, Penn.; 55 miles of 8-inch from Marcus Hook, N. J., to Allentown; 235 miles of 12-inch from Allentown to Oswego, N. Y., and 65 miles of 8-inch from Auburn to Rochester, N. Y.

GULF OIL CORPORATION.

Lufkin, Texas, to Eldorado, Ark.: Company plans 170 miles of 10-inch products line and expansion of feeder system from Port Arthur to Lufkin, Texas, by the conversion of lines now transporting crude to products service. Work will start late in 1952 when salvaged pipe will be available after completion of planned West Texas Gulf 26-inch crude oil line from Colorado City to Port Arthur-Beaumont, Texas.

Helena, Ark., to Nashville, Tenn.: 200 miles of 8- and 10-inch products line. Will also use portion of salvaged pipe available after completion of planned 26-inch crude line from West Texas to Port Arthur-Beaumont area.

Texas Gulf Coast: Company plans 76 miles of 8-inch line from ethylene manufacturing plant at Port Arthur to chemical plant at Deer Park.

THE OHIO OIL COMPANY, Findlay, Ohio.

Illinois: Plans 24 miles of 8-inch line from Wood River to East St. Louis, Ill.

PIONEER PIPE LINE COMPANY.

Wyoming to Utah: The company, jointly owned by Continental Oil Company and Sinclair Oil Corporation, plans 310 miles of 8-inch products line from Sinclair, Wyo., to Salt Lake City, to have a daily capacity of 12,000 barrels. Cost of the projected line will be about $8 million. Plans call for erection of a products terminal costing $1 million with a storage capacity of 500,000 barrels and facilities for loading products at the maximum rate of 2500 barrels per hour. Company officials are considering plans for tying in to Salt Lake Pipe Line Company's line which extends on to the Columbia River in Washington.

PROGRESS PACIFIC PIPE LINE COMPANY.

Texas to California: Company is seeking PAD approval of a 1050-mile, 10-inch products line to parallel a proposed 24-inch crude line from West Texas to Long Beach, Calif. Capacity of the line would be 65,000 barrels daily.

SHELL OIL COMPANY, New York City.

Illinois and Michigan: Approximately one-third of the steel has been allotted for first quarter, 1952, for construction of 235 miles of 14-inch pipe line from Wood River, Ill., to Chicago, and for an 8-inch extension from Chicago to Detroit. The 14-inch line will replace an existing 8-inch from Wood River to Chicago which will be salvaged and used on the Detroit extension. Completion of the project is scheduled for third quarter, 1952.

STANDARD OIL COMPANY, (Indiana), Chicago.

Sugar Creek, Mo. (Refinery), to Dubuque, Iowa: 316 miles of 12-inch products line to tie in to existing Whiting, Ind., to Moorhead, Minn., line. Construction of the line is scheduled to start in the third quarter of 1952. Completion is planned for early 1953.

UNITED STATES PIPE LINE COMPANY, New York City.

Texas to Ohio: Company plans approximately 1200 miles of products line to reach from Beaumont refining area to Cincinnati and Dayton, Ohio. The proposed line would be independently owned and operated with no shipper-owner affiliations.

Gas

ARKANSAS-LOUISIANA GAS COMPANY.

Arkansas: The company made application to lay 16 miles of 8-inch from Claiborne Parish, Louisiana, to Columbia County, Arkansas.

ATLANTIC SEABOARD CORPORATION, Charleston, W. Va.

West Virginia: The company has asked FPC for authority to build four new compressor stations with a total of 18,200 hp, and to add 1100 hp to an existing station on its Cobb, W. Va., to Rockville, Md., 26-inch line. The company has received FPC authorization to build one 3520 hp compressor station in Randolph County, West Virginia.

CALIFORNIA-PACIFIC UTILITY COMPANY.

Topock, Ariz., to Needles, Calif.: FPC authorization has been received for 14.5 miles of 4-inch to tie into Pacific Gas & Electric Company's 34-inch line.

CENTRAL ILLINOIS PUBLIC SERVICE COMPANY.

Illinois: The company has applied to FPC for authority to construct 12.7 miles of 6-inch line from Panhandle Eastern's line to Paris, Ill.

CENTRAL KENTUCKY NATURAL GAS COMPANY.

Kentucky: Company was authorized by FPC to lay 18.6 miles of 12-inch loop lines between Winchester and Lexington, Ky.

CHICAGO DISTRICT PIPE LINE COMPANY, Joliet, Ill.

Illinois: The company has applied to FPC for authority to construct 15 miles of 30-inch line from Texas Illinois Natural Gas Pipeline Company near Elgin, Ill., to Public Service Company of Northern Illinois line.

CITIES SERVICE GAS COMPANY, Oklahoma City.

Kansas: The company has FPC approval for constructing 10 miles of 26-inch line to replace two parallel 16-inch lines and approval to develop two depleted gas fields for storage. The two are Colony field in Anderson County and McLouth field in Leavenworth and Jefferson coun-

AGAIN MODERN GMW's PAY OFF!

on the Texas Gas Transmission Corporation's main line

Line-up of four big, modern Cooper-Bessemer GMW units in Texas Gas Transmission's Jeffersontown station. These are 6-cylinder GMW's rated 1500 hp each.

Cooper-Bessemer GMW compressors offer a combination of money-saving advantages you just can't beat. That's why these modern units play such a big part in powering this and other new major lines.

It's easily summed up . . .

First . . . there's no other way to put so *much* dependable horsepower in a given space. Big savings are made on installation, housing, foundation, piping, maintenance and over-all operating costs.

Second . . . Cooper-Bessemer developments in higher compression, as well as improved ignition and scavenging, mean peak fuel economy, with a big net gain in saleable gas delivered.

And, equally important, smooth running, trouble-free GMW's go on and on with a very minimum of maintenance and down-time. They gain the full benefit of Cooper-Bessemer's many years of experience and development work in the design of modern, V-angle compressor units.

If you have compressor needs from 1500 to 3000 hp coming up, get *all* the facts on GMW's. Weigh the important gains you stand to make. For units of lesser horsepower, the other Cooper-Bessemer V-angles, GMV's and GMX's, will prove to be your best bet.

The Cooper-Bessemer Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York, N. Y. Washington, D. C. Bradford, Penna. Parkersburg, W. Va.
San Francisco, Calif. Houston, Dallas, Greggton, Pampa and
Odessa, Texas Seattle, Wash. Tulsa, Okla. Shreveport, La.
St. Louis, Mo. Los Angeles, Calif. Chicago, Illinois Caracas, Venezuela

ties. The company has petitioned FPC for a permit to build 5½ miles of 6-inch line from a point near Olathe, Kan., to Food Machinery and Chemical Corporation in Johnson County. Another FPC application requests authority to build 15.4 miles of 20-inch to replace a 16-inch line, and to add 340 hp to Welch compressor station in Craig County, Okla., and 1020 hp to Pierce City, Mo., compressor station. Total cost is estimated at $754,800.

COLORADO INTERSTATE GAS COMPANY, Colorado Springs.

Colorado: FPC has granted temporary authorization to construct 49 miles main line loop and laterals; to increase horsepower in Panhandle field compressor station from 4800 to 6600; and to add 1320 hp to compressor station at Kit Carson, Colo. Cost of the project is estimated at $3,453,105.

EAST TENNESSEE NATURAL GAS COMPANY, Chattanooga, Tenn.

Tennessee: Company has applied for certificate to construct 100 miles of 16-inch from Knoxville to Kingsport, Tenn., and necessary laterals, metering and regulating equipment. Estimated cost is $5,264,000.

EL PASO NATURAL GAS COMPANY.

Texas, New Mexico and Arizona: FPC authorized construction of facilities to increase the El Paso system about 100 million cubic feet per day. The construction program, estimated to cost $22,950,000, includes 10.4 miles of 30-inch main line loop and 37,160 hp in new and existing compressor stations, and 18,910 hp in field stations. The company has two amended applications before FPC. One (G-1630) requests authority to construct 36.9 miles of main line loops; 32,560 hp in main line compressor horsepower; field transmission lines; gathering system; dehydration systems; gasoline absorption plant; gas wells and communication facilities. This project, estimated to cost $46,187,686, will permit delivery of (1) an additional 100 Mmcf daily to Pacific Coast, (2) 20 Mmcf per day to Nevada Natural, and (3) remove the annual restrictions on gas deliveries from the San Juan Basin area. The other amended application (G-1631) would provide an additional 200 Mmcf per day for the Pacific Coast. This construction program, estimated to cost $62,695,000, includes 133.3 miles of main line loop; 14,800 additional compressor horsepower in existing stations; 105,000 hp in new and authorized main line booster stations; and other facilities.

West Texas: FPC has approved construction of one 1980 hp compressor station near Shell's TXL plant in Ector County. The company also plans construction of a 1100 hp station near Phillip's gasoline plant in Gaines County. The latter does not require FPC approval.

GLACIER GAS COMPANY, Butte, Mont.

Montana, Idaho and Washington: The company has applied to FPC for authority to construct 285 miles of 20-inch line from Kalispell, Mont., to Spokane, Wash.; 120 miles of 16-inch from Spokane to Hanford, Wash.; 91 miles of 8-inch from Spokane to Lewiston, Idaho; and 130 miles of 12-inch from Spokane to International boundary south of Trail, B. C.

GULF-MICHIGAN GAS TRANSMISSION CORPORATION, St. Louis.

Louisiana to Indiana: The company has applied for authority to construct 680 miles of 30-inch between Perryville, La., and St. John, Ind., with a 25-mile lateral from Belleville, Ill., to east bank of Mississippi River opposite St. Louis. The system, with three compressor stations of approximately 30,800 total horsepower, would supply 150 Mmcf to St. Louis area and 200 Mmcf to Michigan-Wisconsin Pipe Line Company, near St. John, Ind. Gas supply would come from United Gas Pipe Line Company initially.

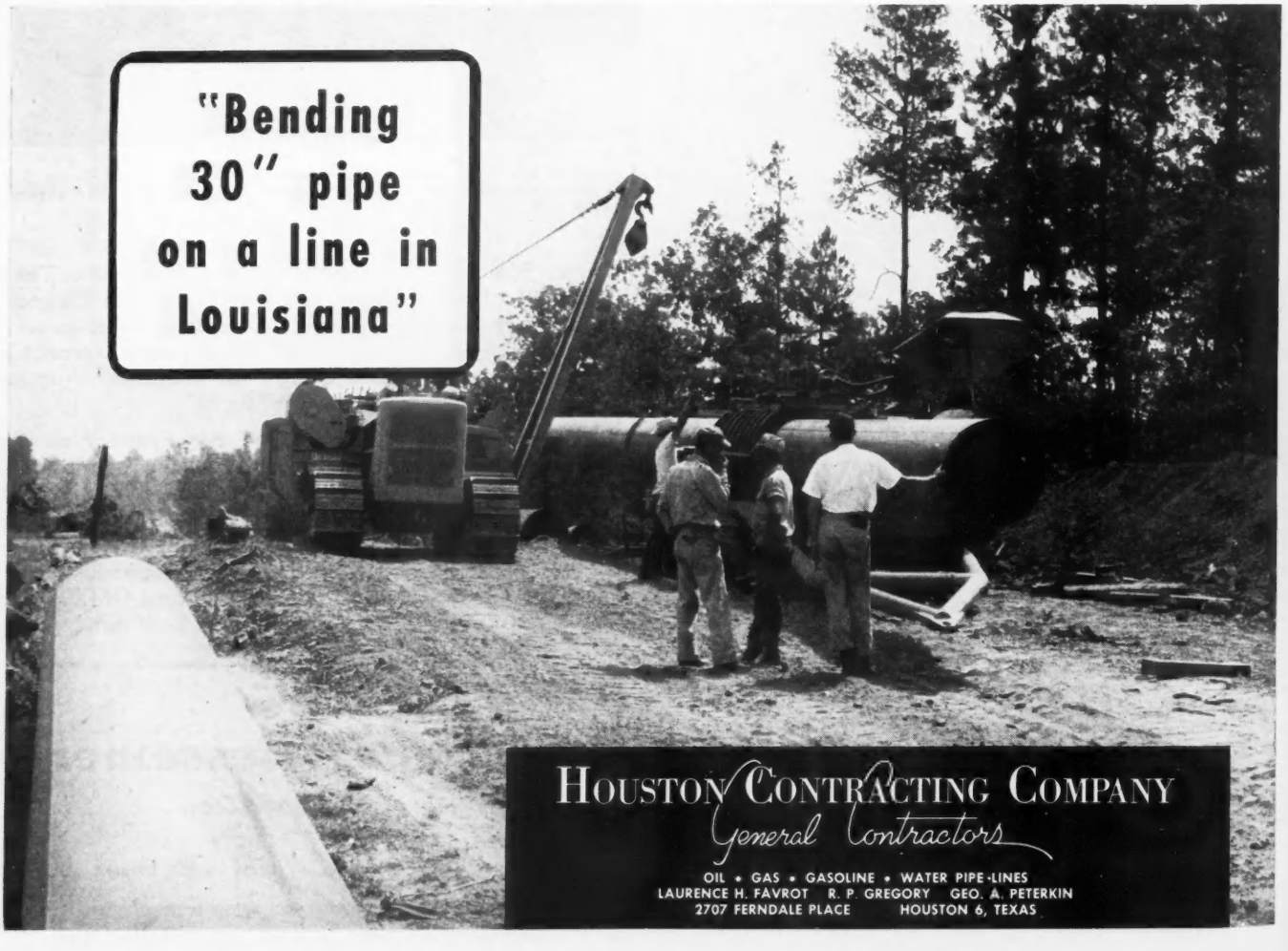
INDIANA GAS AND WATER COMPANY

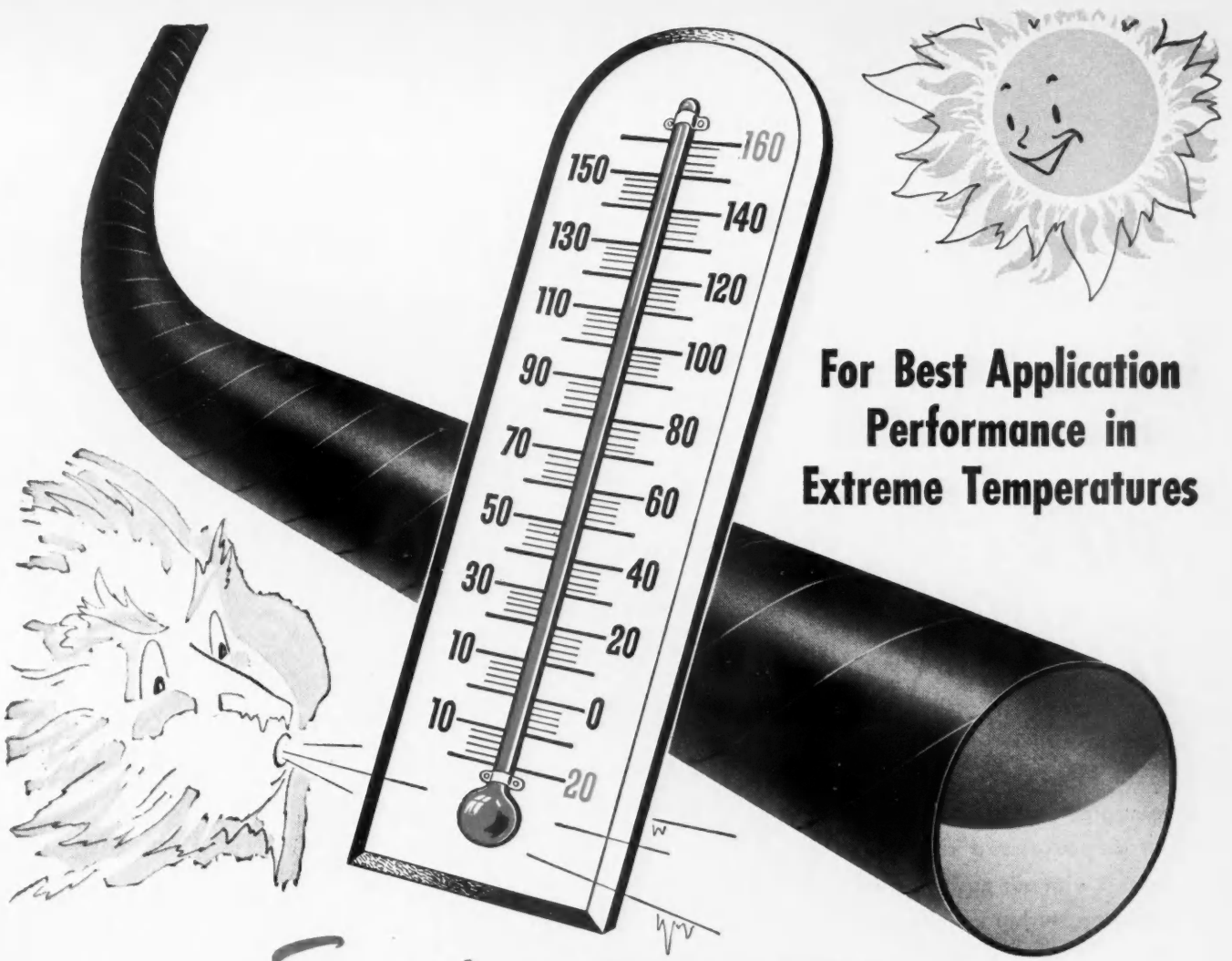
Indiana: The company has asked FPC for permission to construct 19 miles of 8-inch and 13 miles of 6-inch loop lines from Panhandle Eastern's main line to Crawford, Ind., and Lebanon, Ind.

KANSAS-NEBRASKA NATURAL GAS COMPANY, INC., Phillipsburg, Kansas.

Kansas and Nebraska: Applied to FPC December 25, 1951, for authority to build 179 miles of 10-inch line; 93 miles of the line will replace existing line which will be salvaged. The company also is seeking authority to substitute 10-inch line for 52 miles of 8-inch previously authorized by FPC. Total cost estimate is $2,315,220.

Nebraska and Colorado: FPC authorized


"Bending 30" pipe on a line in Louisiana"
HOUSTON CONTRACTING COMPANY
General Contractors
OIL • GAS • GASOLINE • WATER PIPE-LINES
LAURENCE H. FAVROT R. P. GREGORY GEO. A. PETERKIN
2707 FERNDALE PLACE HOUSTON 6, TEXAS



For Best Application Performance in Extreme Temperatures

Specify PITT CHEM PLASTICIZED Grade Pipeline Enamel

Pitt Chem Plasticized Enamel is specially compounded to maintain its excellent application characteristics and bond under virtually all conditions encountered at temperatures ranging from -20° F. to 160° F.

You can count on its consistent high quality, too, because we're a basic producer and control each phase of production from coal to finished coating—in a plant *specifically* designed for manufacturing hot applied pipeline enamel. And because we're basic, we've never failed to meet a delivery deadline.

● *We're always ready to help you do a better and faster pipeline coating job. Just drop us a line and we'll immediately send you specification sheets and technical information . . . or provide the field application assistance you need.*

★ Standard Grade Tar Base Enamel
☆ Modified Grade Tar Base Enamel
★ Plasticized Grade Tar Base Enamel
★ Cold Applied Tar Base Coatings
★ Synthetic Protective Coatings

WBD 3961

PROTECTIVE COATINGS DIVISION

P C&C C

PITTSBURGH COKE & CHEMICAL CO.

Grant Building • Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

ACTUAL PHOTOGRAPH OF PIPE DEFECT

PIPE TROUBLE?

You can eliminate all doubt as to the condition of your pipe by having one of our experienced crews inspect it with our positive flaw detection technique by the Magna Flux Method.

Our photographic recordings and easily understood reports are your best insurance against pipe failures.

PIPE INSPECTION, EITHER INTERNAL OR EXTERNAL, IS OUR *ONLY* BUSINESS.

WESTERN INSPECTION CO. INC.

Call us for service at Houston, Midland, Odessa, Oklahoma City or Lafayette, La.

PIPE INSPECTION

construction of 15 miles of 6-inch and 11 miles of 8-inch from Big Springs field, Deuel County, Nebraska, to Ogallala, Neb.; 2 miles of 2-inch laterals to Big Springs and Brule; 8 miles of 8-inch and 5 miles of 4-inch, Big Springs field to Ovid, Colo.; 13½ miles of 2-inch and 10½ miles of 3-inch laterals to Chappell, Lodge Pole, Ovid and Julesburg, Colo.; and 52 miles of 8-inch from Ogallala to North Platte, Neb. (Company has applied to increase pipe size to 52 miles of 10-inch.)

LAKE SHORE PIPE LINE COMPANY, Cleveland.

Pennsylvania to Ohio: FPC approved construction of 45 miles of 10-inch pipe line from Tennessee Gas Transmission Company's line near Meadville, Penn., to Ashtabula, Ohio. Cost of the line will be more than $1 million.

LONE STAR GAS COMPANY.

West Texas: Company plans 30 miles of 12-inch pipe line from Bronte field, Coke County, to company's system at Maryneal in Nolan County.

MIDSOUTH GAS COMPANY, Little Rock.

Eastern Arkansas: Application is pending before FPC for permission to construct about 240 miles of pipe line to supply 21 communities.

MISSISSIPPI RIVER FUEL CORPORATION, St. Louis.

Louisiana: Company has received temporary authorization from FPC to construct 13 miles of 12-inch line from Bellevue to Sligo field, Bossier Parish, Louisiana.

Illinois: FPC authorized 16.2 miles of 12- and 24-inch pipe line for feeder and withdrawal lines in proposed Monroe County, Waterloo storage field. Cost of the project, which will provide space for storage of 13.2 billion cubic feet of gas and deliverability of 100 million, will exceed $2 million.

NATURAL GAS STORAGE COMPANY, Chicago.

Illinois: The company is seeking FPC permission to develop underground storage area for Natural Gas Pipeline Company of America and Texas Illinois. The initial development would require 6½ miles of pipe line, and 6000 hp in compressor stations. Cost is estimated at $18,100,000. Ultimate development would include 12¾ miles of pipe line and 32,000 hp in compressor station. Cost of the project would be $36,200,000. Ultimately, it would provide storage in Kankakee and Iroquois counties, Illinois, for 90 billion cubic feet with 1½ billion withdrawal per day.

NEW YORK STATE NATURAL GAS CORPORATION, New York City.

Pennsylvania: FPC approved construction of 3080 h.p. compressor station in Leidy gas field, Clinton County, Penn.

New York and Pennsylvania:- Company has applied to FPC for authority to construct 104.7 miles of pipe line in Westmoreland, Armstrong, Tioga and Potter counties, Pennsylvania and Wyoming, Onondaga and Cayuga counties, New York and authority to install 2420 h.p. at two existing compressor stations in Pennsylvania. Cost is estimated at more than $6 million.

New York: FPC authorized construction of 35.2 miles of 20-inch loop from Dryden to Therm City, N.Y. Construction will start in 1953. Also approved by FPC was a 6600 h.p. compressor station, 3300 h.p. to be constructed in 1951, 1100 in 1952 and 2200 in 1953.

Maryland: The company asked FPC for authority to lay 8 miles of 8-inch from Mountain Lake field, Maryland, to proposed line of Hope Natural Gas at Maryland, West Virgina state line.

NORTHEASTERN GAS TRANSMISSION COMPANY, Springfield, Mass.

New England States: The company plans construction of 100 miles of 16-inch pipe line in Connecticut and approximately 130 miles of lateral lines. FPC had previously authorized construction.

NORTHERN GAS COMPANY.

Wyoming: The company has made application to the Wyoming Public Service Commission for a permit to build an 82-mile 6-inch line from the Sand Draw and Beaver Creek fields of Fremont County, to Rawlins, Wyo.

NORTHWEST NATURAL GAS COMPANY, New York City.

Idaho to Washington to Oregon: Amended application with FPC requests authority to build 373 miles of 24-inch pipe line from Eastport, Idaho, to Monroe, Wash.; 79 miles of 18-inch line from Monroe to international boundary near Lynden, Wash.; 29 miles of 22-inch line from Monroe to a point near Seattle; 164 miles of 20-inch from near Seattle to Portland, Ore. In addition, 24,750 compressor station horsepower would be built. Total cost of the project which would have a system capacity of 285 Mmcf per day is estimated at $92 million. Gas for the system would be gathered by Canadian subsidiary, Alberta Natural Gas Grid, Ltd., and transported to border by Alberta Natural Gas Company. Gas would come from Pincher Creek, Princess-Patricia, Many Islands Lake and Dunmore fields of Alberta.

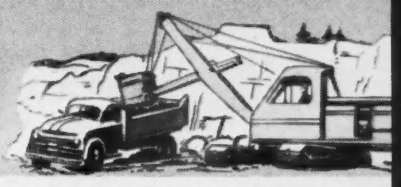
THE OHIO FUEL GAS COMPANY, Columbus.

Ohio: Applied to FPC January 1, 1952 for authority to construct 31.2 miles of 20-inch line from Treat compressor station in Licking County to Weaver storage compressor station in Richland County. The proposed line, estimated to cost $1,440,000, would increase underground storage capacity.

FPC authorized 38 miles of lines in Erie, Madison, Warren and Montgomery Counties, Ohio. The company plans also 74.2 miles of 3 to 20-inch pipe lines in Ashland, Hocking and Knox Counties, Ohio. The company also plans to increase underground storage facilities.

WHEREVER ENGINES WORK

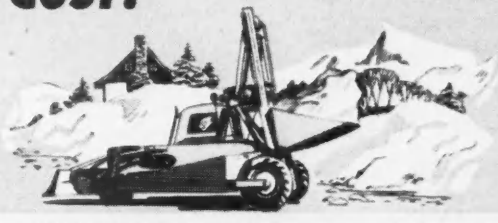
In Construction, Chrysler Powers
Ditching Machines • Cranes • Truck Mixers • Shovels • Loaders • Yarders • Concrete Mixers • Road Pavers • Crane Carriers • Scoop Tractors



In Industry, Chrysler Powers
Air Compressors • Hoists • Derricks • Pumps • Generators • Tractors • Arc Welders • Baling Machines • Conveyors • Tackle Blocks • Winches

Chrysler Industrial Engines Do a Better Job at Lower Cost!

In Farming, Chrysler Powers
Tractors • Combines • Gang Mowers • Spreaders • Irrigation Equipment • Orchard Sprayers • Hay Choppers • Pumps • Feed Mills • Sprinklers



In Other Fields, Chrysler Powers
Locomotives • Motor Coaches • Air Conditioning Equipment • Pulp Machines • Drilling Equipment • Fire Pumps • Snow Plows • Street Flushers • Saw Mill Equipment • Oil Well Pumps and Drillers

Chrysler Industrial 15—one of eight basic models

More manufacturers, more operators of industrial equipment are discovering the brilliant efficiency of Chrysler Industrial Engines on scores of different applications.

For Chrysler Industrial Engines are built *solely for industrial jobs.* Furthermore, Chrysler Industrial Engines are designed and engineered to meet the *specific working requirements* of each type of equipment they power. They can also be adapted to special regional operating conditions.

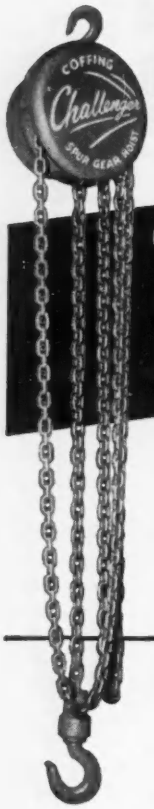
A letter of inquiry will bring an engineer well qualified to discuss your particular application. Address: *Industrial Engine Division, Chrysler Corporation, Detroit 31, Michigan.*

CHRYSLER

HORSEPOWER WITH A PEDIGREE

NEW

Coffing Challenger



What you have been waiting for in a Spur-Gear Hoist

Light Weight

Carry it with one hand. One-ton model, with coil chain for standard lift of 8 ft., weighs only 38 lb.

Ruggedly Dependable

Use it year after year. Long life is built in . . . sealed in. Housing is formed steel plate—will not crack under sudden shock loads. Back plate is laminated for extra rigidity. Hoist mechanism has sealed-in lubricant.

Safe

Trust it to protect men and equipment. Tested at 100 percent overload. All load-holding parts are special alloy steel. This hoist actually has a five-to-one safety factor.

Economical

Service it yourself. The Challenger may be completely disassembled in minutes with simple tools. No lost travel time to and from the factory for repairs.

Find out more about the all-new Coffing Challenger, available in ½- and 1-ton capacities. Write for Bulletin D2C.

COFFING HOIST COMPANY
Danville, Illinois

QUIK-LIFT ELECTRIC HOISTS • HOIST-ALLS • RATCHET LEVER HOISTS • MIGHTY-MIDGET PULLERS • DIFFERENTIAL CHAIN HOISTS • LOAD BINDERS • I-BEAM TROLLEYS

PACIFIC GAS & ELECTRIC COMPANY, San Francisco.

California: Application made to FPC calls for construction of 141 miles of 34-inch lines in four loops on the Topock-Milpitas, Calif., line. Also asked is addition of 5000 h.p. at Topock station; 12,500 h.p. at Hinkley station; and 5280 h.p. at Kettleman station. Facilities would cost $19,391,000 and would raise system's capacity by 150 million cubic feet daily.

Salinas to King City, Calif.: Temporary authorization has been granted by FPC for 44 miles of 8-inch line to be constructed within Monterey County.

PACIFIC NORTHWEST PIPE-LINE CORPORATION, Houston.

Canada, Washington, and Oregon: The company has asked the Alberta Petroleum and Natural Gas Conservation Board to declare 250—350 million cubic feet of natural gas in Edmonton, Pincher Creek areas an exportable surplus.

If the gas is exportable, the company plans to seek approval of the U. S. FPC and the Canadian Board of Transport Commissioners for construction of a line to deliver 250 Mmcf of gas daily to Pacific Northwest area. Cost of this project, which would require approximately 150,000 tons of steel, is estimated at $85 million.

Windsor to Montreal and Ottawa: Through an agreement with Panhandle Eastern and Trunkline, approximately 250 Mmcf of Texas gas could be available to a Canadian affiliate company for delivery to Montreal and Ottawa. This project, estimated to cost $53 million and require 103,000 tons of steel, would utilize the two existing gas systems to transport gas to Windsor, Ont., just across the border from Detroit. Panhandle would supply 100 Mmcf of gas from North Texas fields and Trunkline would transport 150 Mmcf of gas to be purchased in Texas from Humble Oil & Refining Company at 15-18 cents per 1000 cubic feet. New construction required by the plan would include a line from Windsor to Montreal and Ottawa and new gathering facilities in Texas.

If the over-all plan proposed by Pacific Northwest is approved by FPC and Canadian Board of Transport Commissioners, it will supply eastern Canadian market and U. S. Pacific Northwest market with about 250—350 Mmcf of gas each, with expenditure of about $150 million and use of 300,000 tons of steel. FPC hearing is scheduled April 8, 1952.

PANHANDLE EASTERN PIPE LINE COMPANY, Kansas City.

Missouri, Illinois and Indiana: The company has applied to FPC for approval to construct 6.5 miles of 26-inch line east of Houstonia, Mo., compressor station; 7.24 miles of 30-inch extending the 61.5 segment of 30-inch line east of Zionsville, Ind.; and 18.2 miles of 26-inch line from the Edgerton, Ind., station eastward into Ohio. Also included in the request is installation of 2000-h.p. compressor unit at Tuscola, Ill., station and two 2000-h.p. units at Edgerton station.

PERMIAN BASIN PIPE LINE COMPANY, Kansas City.

New Mexico and Texas: The company is planning to build a 375-mile 24 and 30-inch pipe line from Hobbs, N.M., to Texas Panhandle. The line will serve Northern Natural and other gas companies in Panhandle fields. Capacity of the system would be 300 million cubic feet per day.

SHENANDOAH GAS COMPANY.

Virginia: Company applied to FPC for authority to construct 59 miles of lines to serve communities in the Shenandoah Valley from a connection with Virginia Gas Transmission Corporation's system near Strassburg, Va.

SOUTHERN CALIFORNIA GAS COMPANY and SOUTHERN COUNTIES GAS COMPANY, Los Angeles.

California: Authorization obtained from FPC for construction of 23.5 miles of 30-inch line to increase capacity from La Goleta storage field to the Los Angeles metropolitan area. Project would cost $2,611,875.

FPC authority was granted to Southern California Gas Company, for 38 miles of pipe line to tie into Pacific Gas & Electric's trunk near Mojave, and extend to Palmdale, Calif. Project would cost about $362,000.

SOUTHWEST GAS CORPORATION, Barstow, Calif.

California: FPC authorized 27.5 miles of 4-inch line from PG&E's 34-inch to vicinities of Barstow and Victorville, Calif.

TENNESSEE GAS TRANSMISSION COMPANY, Houston.

Texas to West Virginia and New York: Authorized by FPC on docket G—1248 but not yet constructed is 485 miles of big-inch pipe lines and more than 75,000 h.p. in compressor station capacity. The company has asked FPC for approval of a proposed $128,216,000 expansion program which would increase daily capacity from its presently authorized 1,310,000,000 cubic feet per day to 1,515,000,000 cubic feet. Peak day deliveries would be increased to 1,715,000,000. To effect the increase, the company requests authorization of 591 miles of 30 and 26-inch loops, a new 304 mile line from existing system at Mercer, Penn., through Hebron field to existing system at Utica, N.Y., and 165,000 h.p. to be installed at new and existing compressor stations.

TEXAS GAS TRANSMISSION COMPANY, Owensboro, Ky.

Louisiana to Kentucky: An FPC application dated December 6, 1951, requests authority to construct 407 miles of 26-inch loop lines between Bastrop, La., and Hardinsburg, Ky. The application includes request for 26,860 compressor station horsepower. Over-all cost is estimated at $33,752,705.

The company has received temporary authorization from FPC to install 12,240 h.p. at one new, and four existing, stations. Under the temporary authorization, Texas Gas will build a new 5280 h.p. compressor station near Madison, Ind., and will install 6960 h.p. additional at existing station at Kenton, Tenn., Calvert City, Slaughters, and Hardinsburg, Ky.

TEXAS-OHIO GAS COMPANY, Houston.

Texas to West Virginia: The company has applied to FPC for permit to construct 1350 miles of 30-inch line from

SETTING A NEW STANDARD- of Service

...for oil field supplies!

United Supply Stores are Strategically Located to give you Superior Service . . .

OKLAHOMA –
- ELK CITY
- OKLAHOMA CITY (Office & Store)
- PAULS VALLEY
- RINGWOOD
- SEMINOLE
- TULSA (Home Office & Factory)
- VELMA

KANSAS –
- HUTCHINSON
- PRATT

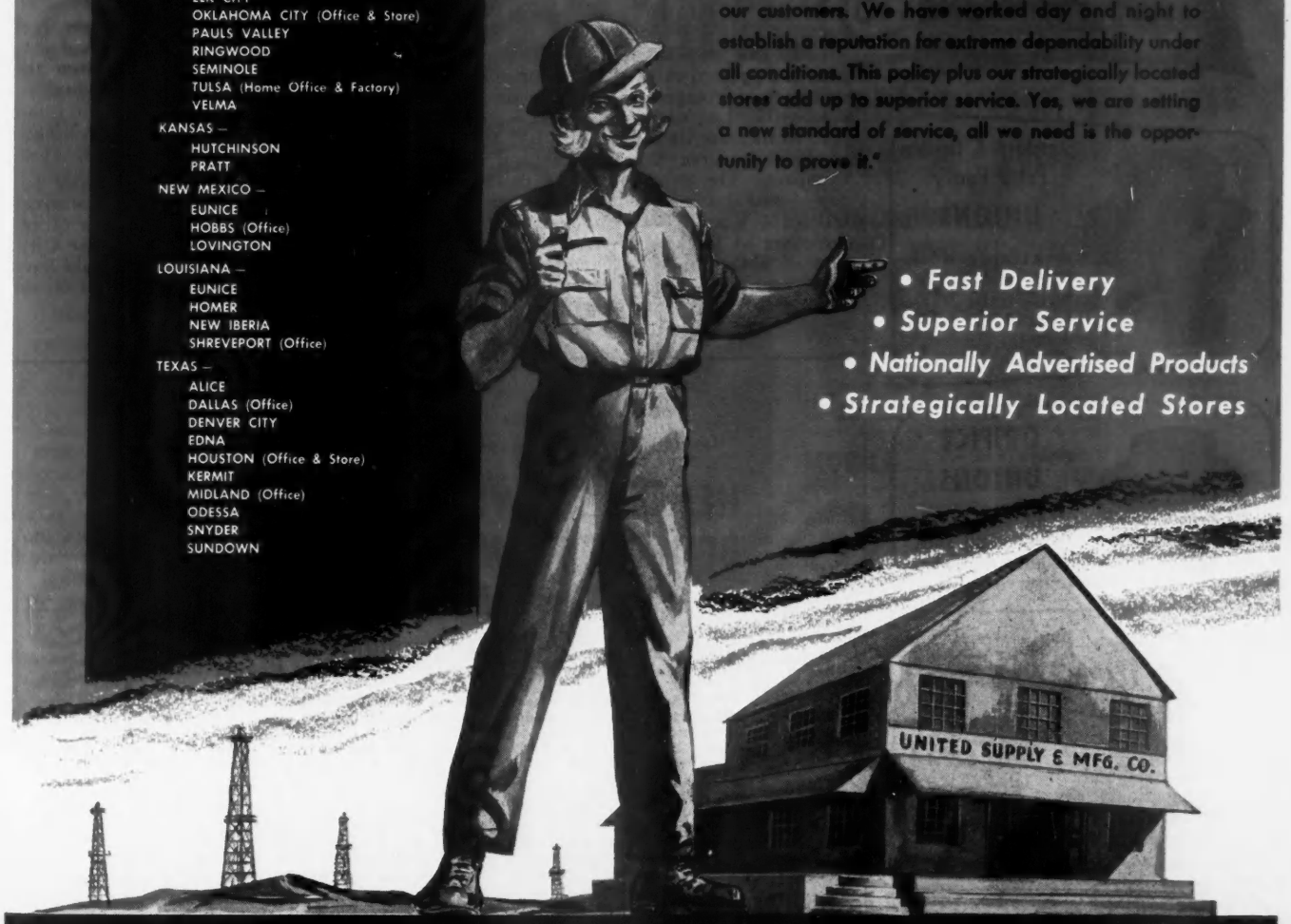
NEW MEXICO –
- EUNICE
- HOBBS (Office)
- LOVINGTON

LOUISIANA –
- EUNICE
- HOMER
- NEW IBERIA
- SHREVEPORT (Office)

TEXAS –
- ALICE
- DALLAS (Office)
- DENVER CITY
- EDNA
- HOUSTON (Office & Store)
- KERMIT
- MIDLAND (Office)
- ODESSA
- SNYDER
- SUNDOWN

Uncle Sandy says, "Our growth in the past few years is proof that we are doing something extra for all of our customers. We have worked day and night to establish a reputation for extreme dependability under all conditions. This policy plus our strategically located stores add up to superior service. Yes, we are setting a new standard of service, all we need is the opportunity to prove it."

- *Fast Delivery*
- *Superior Service*
- *Nationally Advertised Products*
- *Strategically Located Stores*



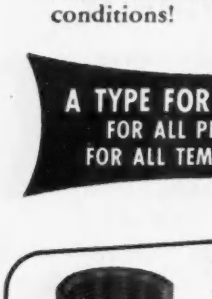
Courtesy
Service
Dependability

UNITED SUPPLY
AND *Manufacturing* COMPANY
TULSA, OKLAHOMA
Stores in Kansas, Oklahoma, Texas,
Louisiana, and New Mexico

Catawissa PERFECT SEAL Unions

HOT FORGED from solid, rectangular steel bars, designed and produced for dependable, long-life service under the severest piping conditions!

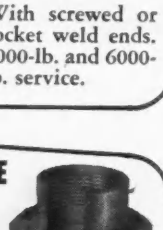
A TYPE FOR EVERY USE!
FOR ALL PRESSURES!
FOR ALL TEMPERATURES!



Standard & Double Extra Heavy
UNIONS
Available with screwed or socket weld ends. 3000-lb. sizes 1/8" to 3"; 6000-lb. sizes 1/8" to 2".

ORIFICE UNIONS
With screwed or socket weld ends. 3000-lb. and 6000-lb. service.

MALE & FEMALE UNIONS
With steel-to-steel, bronze-to-steel, stainless steel-to-steel or orifice seats. 3000-lb. service only.



Standard & Double Extra Heavy
LUG NUT UNIONS
Hammer-type for quick opening and quick closing.

write for your free copy of
CATALOG 11
for complete information

CATAWISSA VALVE AND FITTINGS COMPANY
60 Mill St. · CATAWISSA, PA.

Hidalgo County, southwestern Texas to Spencer, W. Va. The system would have 13 stations with a total of 140,000 h.p. It would cost about $185 million. Initial capacity would be 330 Mmcf daily and ultimate would be 650 Mmcf.

TRANSCONTINENTAL GAS PIPE LINE CORPORATION, Houston.

South Carolina: The company has applied to FPC for authority to construct a sales meter station at Laurens, S. C., to measure 4 Mmcf gas per day, which will be sold to Laurens Glass Works, Inc.

UNITED GAS PIPE LINE COMPANY.

Louisiana: The company has asked FPC to permit installation of 11.3 miles of 20-inch pipe line from Kent Bavou and Turtle Bayou gas fields to United's 24-inch line under construction in Terrebonne Parish.

Louisiana and Mississippi: The company has applied to FPC to authorize construction of compressor facilities on Napoleonville, La., to Kosciusko, Miss., pipe line, to increase its capacity by 100 Mmcf per day to serve Southern Natural Gas Company. The proposal is for two new compressor stations having a total capacity of 13,280 h.p., one at Napoleonville and the other at Jackson, Miss., and for addition of 8000 h.p. to two authorized stations near Montpelier, La. and Walthall County, Miss. Estimated cost of the proposed facilities is approximately $5,764,000.

Texas: The company has applied to FPC for authority to construct approximately 36 miles of pipe line to connect its transmission system with Mustang Island (Red Fish Bay) field. Capacity of the new line would be 130 million cubic feet per day and would cost $2,735,000.

UNITED NATURAL GAS COMPANY, Oil City, Penn.

Pennsylvania: Company applied to FPC on December 26, 1951, for authority to construct 11 miles of 12-inch line in Venango County, Penn., 10 miles of 6-inch line in Warren County, and 3.5 miles of 12 and 6-inch lines in Steuben County. An additional 400 h.p. would be added at Tuscarora storage compressor station. The project is estimated to cost $390,500.

UTAH NATURAL GAS COMPANY, Salt Lake City.

Utah: The company has approval of the Utah Public Service Commission to build a 325-mile 22-inch line from the Four Corners area to Salt Lake City.

UTAH PIPE LINE COMPANY, Dallas.

New Mexico to Utah: Company has applied to FPC for authority to construct 374 miles of 22-inch and 18 miles of 16-inch from Aztec, N.M. to Salt Lake City. The proposed $22 million line would have capacity of 96 million cubic feet of gas per day.

1942 REVISED AND ENLARGED EDITION
Including a comprehensive new section on Photography

HENLEY'S TWENTIETH CENTURY BOOK OF FORMULAS, PROCESSES AND TRADE SECRETS

A TREASURE-HOUSE OF SCIENTIFIC FORMULAS,
Trade Secrets, Chemical Processes and Money Making Ideas

Every owner of this book can profit through its use, not only from information gleaned from its pages, but from new discoveries; or from new applications or uses, inspired by its interesting disclosures. HENLEY'S FORMULA BOOK is one of those rare "finds" upon which no one can lose anything, and from which one may gain everything.

Manufacturers, Chemists, Electricians, Housewives, Dentists, Farmers—men and women in every trade and profession — call **HENLEY'S 20th CENTURY BOOK OF FORMULAS, PROCESSES AND TRADE SECRETS,** the most valuable book of its kind. Nearly 10,000 formulas, processes, trade secrets. A wealth of practical, accurate knowledge and guidance. Formulas for almost everything imaginable. New ways of doing things. Technical processes. So-called trade secrets. Many people have found this book a starting point for their own businesses. It has helped thousands make more from their present businesses and professions.

How to make all kinds of Adhesives and Alloys for every purpose; Anti-Freezing Solutions; Beauty Preparations; Beverages — all kinds; Brass re-finishing and renovating; Bronze Powders; Casein; Cement Fillers; Cleaning Preparations; Cosmetics of all kinds; Chromium Plating; Dandruff Cures; Electro-plating and Electrotyping; Essences and Extracts of Fruits; Freezing Mixtures; Glazes; Inks of all sorts; Insecticides; Lacquers; Laundry Preparations; Leather; Lubricants; Mirrors; Ointments; Paints; Paper; Perfumes; Photography—including all the latest developments; Plastics; Polishes; Refrigerant Deodorizer; Soldering; Varnishes; Waterproofing; Weights and Measures; Wood Preservation. Thousands of other practical, tested methods for doing things.

SIZE 8½ x 5½—900 pages cloth bound—PRICE $4.00
"Prices subject to change without notice"

Send orders to

THE GULF PUBLISHING COMPANY
P. O. Drawer 2608 Houston, Texas

Principal Lines Under Construction

Crude

CONTINENTAL OIL COMPANY.

Texas: Western Construction Company, Hobbs, N.M., is laying 50 miles of 8-inch from Port Isabel to McAllen, Texas. Remaining 55 miles to be contracted later.

PLAINS PIPE LINE COMPANY, (Phillips and Cities Service).

West Texas: George Tucker Pipe Line Construction Company of Odessa, Texas, is constructing 51 miles of 8-inch to gather Spraberry crude, trying to Phillips' 12-inch line at Goldsmith and to Basin Pipe Line at Midland, Texas.

PLATTE PIPE LINE COMPANY.

Wyoming to Illinois: R. H. Fulton and Company, Lubbock, Texas, is constructing 573 miles of 16 and 20-inch from Worland, Wyo., to Holdrege, Neb.; Bishop and Lock Construction Company, Dallas, will start 142 miles of 20-inch from Holdrege to Marysville, Kansas this spring; Rumsey Brothers Pipe Line Construction Company, Wichita, will start 100 miles of 20-inch from Marysville to St. Joseph, Mo.

SERVICE PIPE LINE COMPANY, Tulsa.

Oklahoma: G. G. Griffis Construction Company, Tulsa, is constructing 29 miles of 20-inch loops: 15 miles between Drumright and Terlton, Okla., and 14 miles between Blake and Havana, Okla.

West Texas: Vaughn and Taylor Construction Company, Inc., Wichita Falls, Texas, started construction of 39 miles of 10-inch pipe line between Cogdell station, Kent County, to Old Glory station Stonewall County, Texas.

SINCLAIR PIPE LINE COMPANY

Oklahoma and Kansas: The company has awarded a contract for 154 miles of 24-inch line from Drumright, Okla., to Humboldt, Kansas. Contract on remaining 521 miles of 24 and 22-inch pipe line will be let when steel becomes available.

THE TEXAS COMPANY.

California: Engineers Limited Pipeline Company, San Francisco, is now laying 30 miles of 8-inch crude line from Ventura Avenue field, Ventura County, to company's station at Fillmore.

TUSCORA OIL COMPANY.

Pennsylvania: Pipeline Construction and Drilling Company, Camp Hill, Penn. is constructing 46 miles of 10-inch from Midland to Russelton, Penn.

WEST TEXAS GULF PIPE LINE COMPANY.

West Texas to East Texas Gulf: Anderson Brothers Corporation, Houston, has contract for 94 miles of 26-inch between Granbury and Wortham, Texas. This is a portion of the 466-mile system of 24- and 26-inch line to be constructed between Colorado City and the Beaumont-Port Arthur refining area. Crude stream from West Texas will split at Wortham where 114 miles of 20-inch line will branch off to Longview to feed into Mid-Valley and other pipe line companies' systems. PAD has allotted 58,000 tons of the 130,000 tons of steel required to construct line. Remainder of tonnage to follow in second and third quarters of 1952, since completion is scheduled for September, 1952.

This line, to cost about $39 million, will be jointly owned by Gulf Oil Corporation, The Pure Oil Company, Cities Service Company, Sun Oil Company and Standard Oil Company of Ohio.

Products

PHILLIPS PETROLEUM COMPANY.

Borger, Texas to East Chicago, Ind.: 498 miles of 12, 10 and 8-inch products line. Brown-Lite Company, Tulsa, is building 101 miles of 8-inch and 68 miles of 12-inch from Osawatomie to El Dorado, Kansas; Somerville Construction Company, Ada, Mich. is building 48 miles of 8-inch from Farmer City, Ill., to Piper City, Ill., and 25 miles of 8-inch from Beecher, Ill., to East Chicago, Ind.; Smith-Donaho Contracting Company, Ft. Worth, is building 41 miles of 10-inch from Louisburg, Kan-

PEWTHERS' "EARTHRIPPER"

OPENS THE EARTH LIKE A ZIPPER!

Pewthers' "EARTHRIPPER" is the only ditcher built into a truck. This means *one man* can handle your ditching job, from driving the machine to the ditch site to opening the earth to a maximum depth of five feet. The EARTHRIPPER is particularly suited for gas lines, extensions and house-to-street service lines. Utility ditching requiring ditches 10", 14", or 18" wide are duck soup to this new, *different* Pewthers' ditcher.

ECONOMICAL... Pewthers' EARTHRIPPER saves money three ways! It costs less—it's speedy operation saves labor costs . . . and standardization of automotive parts cuts down maintenance costs. Construction engineers who use the Pewthers' EARTHRIPPER have found that it costs only 4c a foot to operate. This low cost covers initial investment, depreciation, operation, maintenance, and labor over a three-year period! With an EARTHRIPPER, one man can handle your ditching problems, from driving the machine to the ditch site to lowering the boom and opening the earth at a maximum rate of twenty feet a minute! Because all gears run in oil, the EARTHRIPPER can be used for years with few replacements of parts. If you want to save time and money, invest in an EARTHRIPPER today.

MOBILE... The EARTHRIPPER is versatile because it is mobile. On the highway its speed is the speed of the truck. The raised boom clears telephone wires and tree branches, making transit easy and speedy, even in heavy city traffic. The EARTHRIPPER digs vertical ditches in any kind of terrain under almost any digging conditions. On slopes the frame levels. While the tires follow the contour of the earth, the ditcher digs a vertical ditch! If you need a ditcher for large or small ditching jobs, the EARTHRIPPER can solve your problems.

EFFICIENT... For straight, clean ditching, the answer is Pewthers' EARTHRIPPER. This new, unique ditcher offers a completely different design. It is the first ditcher to be built into a truck. Bucket design saves time because there is no loss of time in cleaning. Bottom of each bucket forms the top of the preceding one. The buckets separate as they go over the top sprocket, throwing the dirt onto the conveyor belt. Conveyor belts throw the dirt on either side of the ditch and can be reversed on a moment's notice. In competition the EARTHRIPPER digs straight ditches with clean sides . . . in record time.

Send for the folder on the new Pewthers' ditcher, the EARTHRIPPER. Learn for yourself how the EARTHRIPPER can save time and money on any small ditching job! Ask for a demonstration before purchase . . . at any point in the United States!

I want the new folder on the Pewthers' "EARTHRIPPER."

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

I saw this ad in the above magazine.

PEWTHERS DITCHER COMPANY

2323 CLAIBORNE AVE. • SHREVEPORT, LOUISIANA

GENERAL
PIPE LINE
CONTRACTORS

Personal Supervision on
Construction of Your

Pipe Lines • Water Lines
Sewer Lines • Excavations
Salt Water Disposals

TROJAN
CONSTRUCTION CO.
INCORPORATED
1416½ N. ROBINSON
OKLA. CITY, OKLA. PH. 2-7696
WAREHOUSE PHONE 6-1430

sas, to Harrisonville, Mo. Mid-States Construction Company, Mt. Vernon, Ill., is building 42.3 miles of 10-inch near Sedalia, Mo., and Washington, Mo.; Arey-Phillips Construction Co., Pampa, Texas, 19.5 miles of 6, 10, 12 and 16-inch in vicinity of Pampa, Texas; Trojan Construction Company, Oklahoma City, 40 miles of 10-inch from California, Mo. to Bay, Mo.

Gas

ALGONQUIN GAS TRANSMISSION COMPANY, Boston.

New Jersey: Construction Service Company, Bound Brook, N.J., is constructing 22 miles of 26-inch from Lambertsville to Far Hills, N.J.

MAGNOLIA PETROLEUM COMPANY, Dallas.

West Texas: Bishop and Lock Construction Company, Dallas, is laying 82 miles of 2-through 24-inch line in Pegasus field, Midland and Upton counties, Texas.

MICHIGAN GAS STORAGE COMPANY, Jackson, Mich.

Michigan: Mahoney Contracting Company, Lansing, Mich., is laying 78 miles of 16, 22 and 24-inch pipe and 30 miles of 26-inch between Laingsburg Junction and Pontiac, Mt. Clemens, Mich. The job includes construction of 7400-hp. compressor capacity at Muskegon River station.

OKLAHOMA NATURAL GAS COMPANY.

Oklahoma: Trojan Construction Company, Oklahoma City, is laying 93 miles of 6 to 24-inch in Oklahoma.

PEOPLES NATURAL GAS COMPANY

Pennsylvania: Pipeline Construction and Drilling Company is taking up 100 miles of 6 and 8-inch line from Center Bridge to Reading, Penn.

TEXAS EASTERN TRANSMISSION COMPANY, Shreveport.

Mississippi to Pennsylvania: Anderson Brothers Corporation, Houston, is constructing 217 miles of 30-inch pipe line from Ohio River near Portsmouth, Ohio, to a point near Connellsville, Penn. Associated Pipe Line Contractors is completing 15 miles of 30-inch from Gamaliel to Tompkinsville, Ky.

UNITED GAS PIPE LINE COMPANY, Shreveport.

Mississippi, Louisiana and Texas: River Construction Corporation, Fort Worth (formerly Texas-Louisiana M-K Company) has contract for major portion of 1000 miles of 30 and 20-inch natural gas lines; undetermined amount of 30-inch running from Louisiana line to Kosciusko, Miss.; 100 miles of 20-inch running from Dupont plant at Orange, Texas, to Houston; and 35 miles of 30-inch from Pearl River south of Jackson, Miss., to Pearl River north of Jackson.

Oklahoma Contracting Company, Dallas, has contract for 54 miles of 24-inch from Refugio to Agua Dulce, Texas; 80 miles of 30-inch from Edna to Refugio, Texas; 70 miles of 30-inch from Needville Station to point near Conroe.

Prime contractor for United's work is joint venture company, Gulf-Southern Contractors.

This expansion, when complete, will increase United Gas Pipe Line Company's system capacity 1 billion cubic feet per day.

SMITH-DONAHO
CONTRACTING CO.

J. H. (Herb) Smith
Marvin Donaho
ENGAGING IN

General Pipeline
Construction Work

205 N. W. 7TH STREET
FORT WORTH, TEXAS
PHONE FORTUNE-1384

SMITH-DONAHO CONTRACTING COMPANY offers a lifetime of pipeline construction experience. We are interested in bidding on your jobs, large or small, wherever they are located.

It pays to read
WORLD OIL

Start a personal subscription to World Oil by filling in and returning this coupon. We will begin service immediately.

☐ 1 year $2. ☐ 3 years $4.

Name_____
Address_____
City_____ State_____
Your Company_____
Your Position_____

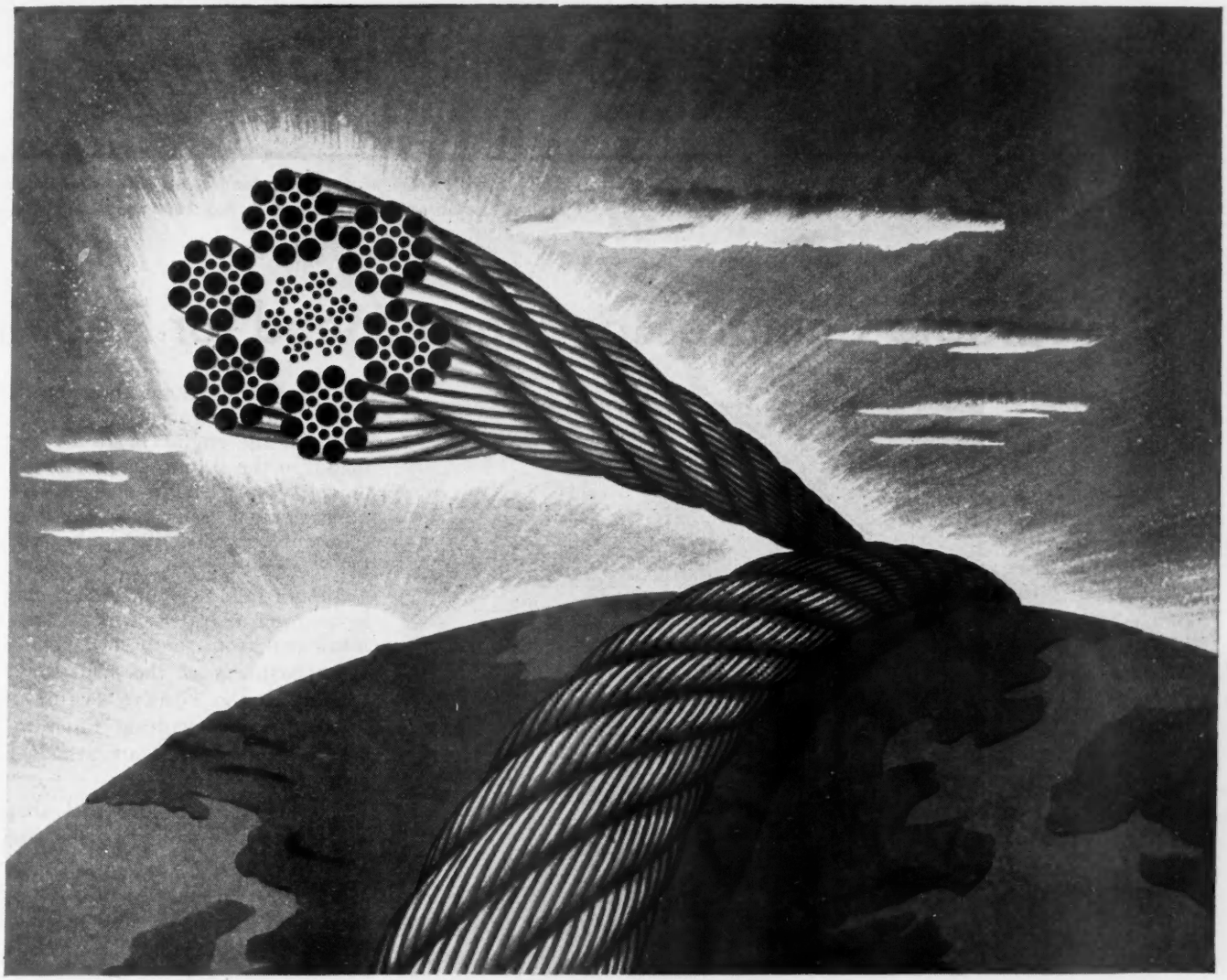
Check division of industry

☐ Drilling ☐ Pipe Line ☐ Equipment
☐ Producing ☐ Exploration ☐ Supplies

☐ My check is enclosed ☐ Bill me

Mail to:

WORLD OIL
P. O. BOX 2608 HOUSTON 1, TEXAS



Rope that Sticks With You

We think of the world as a pretty big place, yet one distributor alone has sold enough Bethlehem wire rope to girdle the globe several times. And this total, impressive though it is, represents only a fraction of all the Bethlehem rope sold through the years.

This, we think, is the best possible evidence of a product sound in quality, sound in performance. Bethlehem rope has been approved by a jury of users far too vast to number — men fully qualified to pick and choose. They could, if they wished, buy other makes of rope. But they stick with the Bethlehem brand because it sticks with them.

It gives them every penny's worth of value for the hard cash they spend.

If you yourself are a user of Bethlehem rope, we don't have to tell you much about it. If you aren't, we hope you'll soon try some of this tough, sturdy product. It will do the job you expect it to do . . . and more.

For a great many applications we strongly recommend Form-Set (preformed) wire rope. It's so easy to handle, and it now costs very little more than nonpreformed.

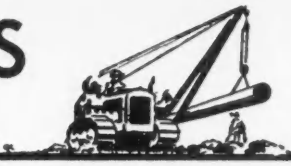
BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

When you think WIRE ROPE . . . think BETHLEHEM

How to do it! PIPE LINE HINTS



$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas

HOW TO—Cradle Compressor Engine Head for Repair

An inexpensive cradle designed to save money and time in machining and repairing compressor engine heads was devised by two Tennessee Gas Transmission Company employees at Station O, Agua Dulce, Texas.

This handy shop jig, which can be made from scrap materials, simplifies handling heavy engine heads. The axles of small diameter pipe can serve as handles to facilitate lifting the head and transporting it from compressor building to machine shop. Once in the shop and on the frame, the head can be easily tilted and held in position by one man.

Size of the frame, brackets and axles should be governed by size and shape of the engine heads to be repaired in the station shop. The axles, made of short lengths of pipe, should be positioned as near as possible to the center of gravity of the engine head.

Supporting the upright members is a square frame which can be fabricated from scrap steel. The upright members of the structure are welded to the square frame and notched with a cutting torch to fit the pipe axles which are attached to the engine head.

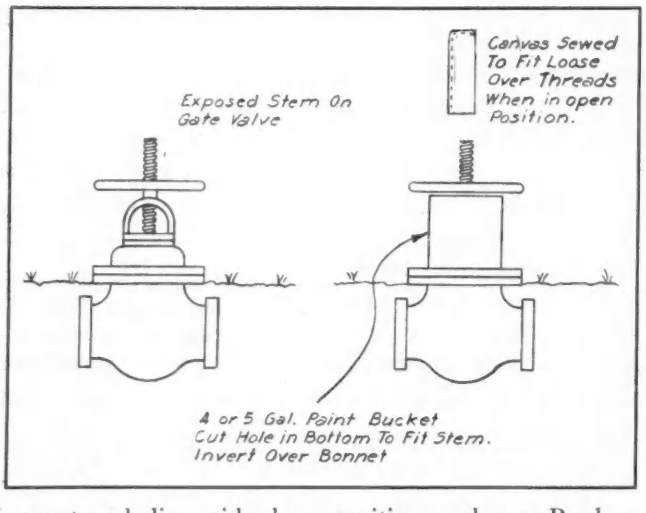
The axles are welded to L-shaped clips which are bolted to the engine heads.

The cradle was designed by William C. Dreinhofer, station superintendent, and Lester Dean Smith, assistant superintendent. Pictured here in Station O machine shop is Repairman Oskar Austreim demonstrating the ease with which the heavy engine head can be tilted to facilitate repair work.

HOW TO—Prevent Damage to Gate Valve Rising Stem

A five-gallon paint bucket and a canvas sheath protect the stem and upper part of a gate valve from dirt and sand to provide trouble-free valve operation.

To gain this added protection, cut a hole slightly larger than the valve stem in bottom of a paint bucket, sized to fit a particular valve. Remove the valve wheel and locking nut and slip the bucket over the valve stem in upside down position as shown. Replace the valve wheel and locking nut.


Canvas Sewed To Fit Loose Over Threads When in open Position.
Exposed Stem On Gate Valve
4 or 5 Gal. Paint Bucket Cut Hole in Bottom To Fit Stem. Invert Over Bonnet

This bucket will protect upper part of the valve from dirt and sand as well as threads on the valve stem.

A small "sock" or sheath, cut from ordinary canvas, sized for snug fit on valve stem and painted to achieve dust resistance, can be used to protect threads of a rising stem valve which is left open for long periods.

Advantages of protecting threads from dirt and sand are many:

- Elimination of difficult valve operation often caused by improper lubrication.
- Longer lasting threads in the valve stem.
- Elimination of damage from wrenches and cheaters used to operate the valve.

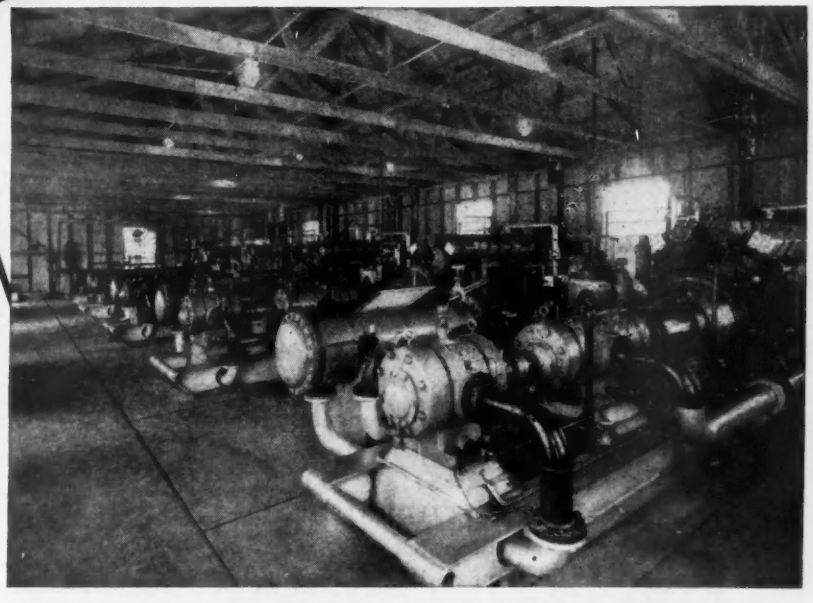
FEW moving parts

means LOW MAINTENANCE

means ECONOMICAL OPERATION

means FULL DEPENDABILITY

FULLER ROTARY COMPRESSORS



Five two-stage natural gas boosters, each handling 1,770,000 SCFD, boosting from 10-lb. gage to 120-lb. gage, at speed of 800 r.p.m., driven by Climax engines.

Fuller Rotary Compressors are engineered and built to insure a fully dependable source of power in the overall picture of your operations. They are the economical choice for general plant air, purging gas, refrigeration in alkalization units, and for handling natural, manufactured, and various refinery gases. In booster operations, whether for field boosting or to trunk line levels, you'll find Fullers doing a better job. Moving parts have been kept to a minimum—rotor, bearings, blades—require little attention.

There are no valves to leak, no seats to grind. Blades automatically compensate for wear. Force-feed lubrication to all parts within the cylinder insures constant protection, with minimum wear.

Oil men have put Fullers on their payroll. They've found them to be completely reliable, under all conditions of service—and they've found them to be as economical to operate as they are dependable.

Why not investigate this modern, efficient compressor the next time you are in the market? Write for literature illustrating and describing these machines.

Fuller

PIONEERS OF HIGH-EFFICIENCY ROTARY COMPRESSORS

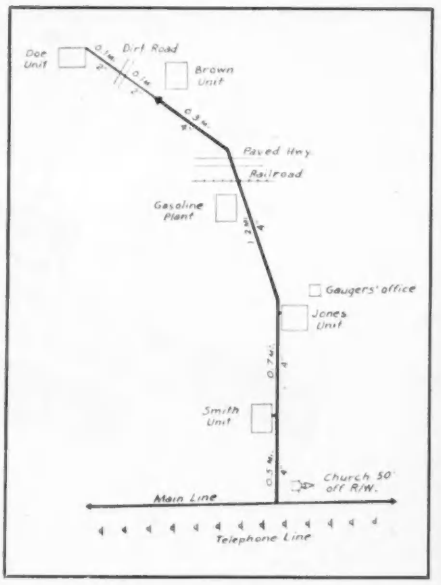
FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
420 Chancery Bldg., San Francisco 4

C-220

HOW TO—Prepare Maps for Aerial Pipe Line Patrol

Special maps for aerial pipe line patrol pilots which include familiar landmarks such as railroads, churches, main roads and plants can aid the pilot in reporting exact location of leaks, washes and other pipe line troubles.

Today, almost all pipe lines are patrolled from the air. Flying at low altitudes, pilots can spot washes, leaks, erosion and nearby construction which may affect pipe line operation. Often when the pilot spots trouble on the right-of-way he finds it difficult to describe the exact location to maintenance headquarters. It may be necessary to fly the area to pick out landmarks which will aid pipe line crews in reaching trouble points. Delay may be disastrous.



An easily prepared pipe line map can speed understanding between pilot and pipe line maintenance crews. The map, which need not be to scale, should show bearings and indicate distances along the right-of-way. All railroads, highways and streams should be shown on the map to facilitate reports. Churches and other structures easily discerned from the air should be emphasized on the map.

In addition to aiding the pilot in making reports, these maps may help him identify unfamiliar pipe line rights-of-way for gathering lines, etc.

Pipeline Problems

?

Consult with the oldest and most experienced Pipeline Construction organization in the world! WILLIAMS BROTHERS! The most modern methods, finest equipment and experienced personnel are your assurance of a better job!

WILLIAMS BROTHERS

ENGINEERS
CONTRACTORS

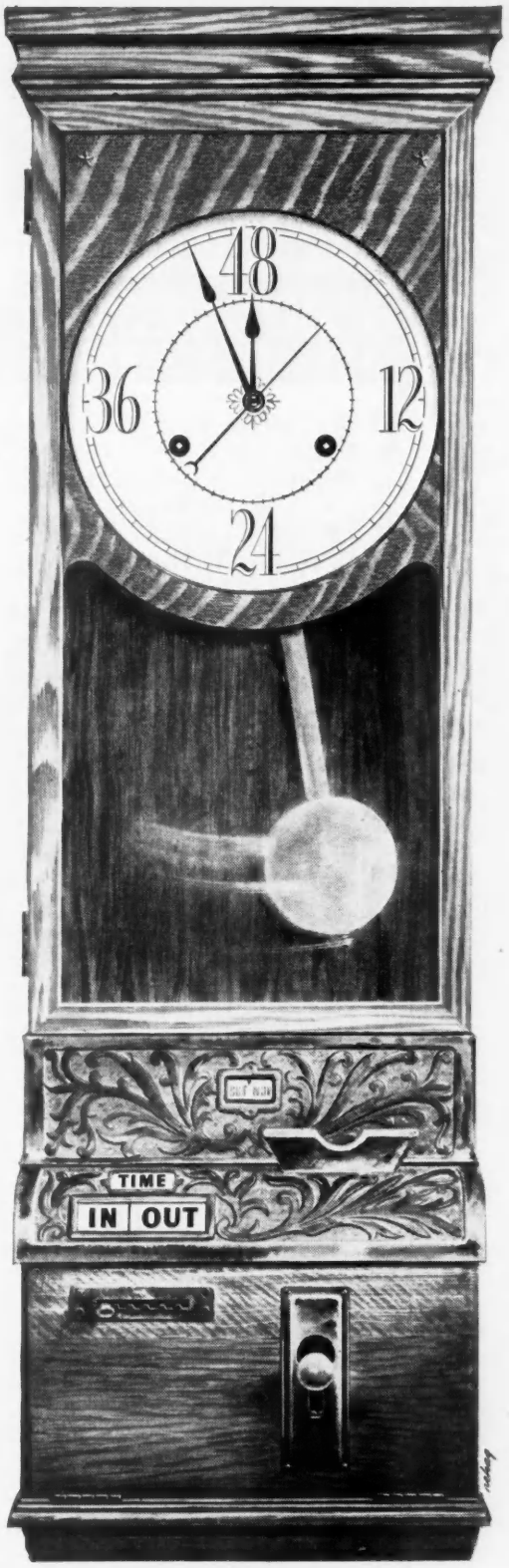
Oil—Gas—Products—Water
Pipelines and Pumping Stations

TULSA
NEW YORK
ATLANTA
LOUISVILLE

CARACAS • MARACAIBO • BOGOTA • LA PAZ

HOW TO—
Improve Visibility Of Survey Stakes

Stakes marking the pipe line right-of-way can be seen readily when they are capped by white paper cups. Especially valuable when used on turning point stakes, the white markers show up plainly, even in wooded sections. Where there are many turns in a line of survey, a white cup makes each bend stand out, thus avoiding the error of shooting on the wrong stake.



Too bad it can't be invented!

If someone could invent a day 48 hours long, you can be sure Kaiser Steel would be among the first to adopt it.

But Kaiser Steel is working around the 24-hour clock to produce more steel in order to meet pressing demands for many products—including Kaiser Steel line pipe.

Backing up this work schedule, Kaiser Steel is constantly expanding plant facilities to bring still more steel.

Kaiser Steel line pipe to conform to latest API specifications is produced in diameters from ½ inch to 30 inches, and in lengths up to 55 feet. Shipping points are Fontana and Napa, California.

It's good business to do business with

Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅛" to 12¾" O.D.	Up to 55'	.188" to .400"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION Los Angeles, Oakland, Seattle, Portland, Houston, Tulsa, New York

KEROTEST

FORGED STEEL

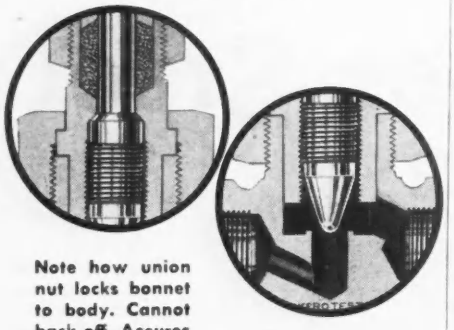
NEEDLE VALVES

FOR

- HIGH PRESSURE
- CORROSIVE SERVICES

8000 W.O.G.

Forged steel safety union bonnet type that permits repacking under full pressure. Supplied in specific materials for ordinary or corrosive services—globe or angle styles. N20 and N21 types for working pressures to 8000 lbs. W.O.G. Sizes 1/8" to 3/4". Write for bulletin 51-N.



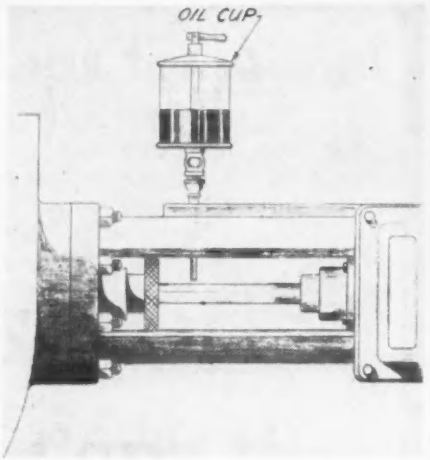
Note how union nut locks bonnet to body. Cannot back off. Assures safe repacking under pressure. Stem back seats for safety. Conical stem tip provides micrometer throttling action and positive seal.

KEROTEST MANUFACTURING COMPANY

Pittsburgh 22, Pa.

New York Chicago Charleston, W. Va. Tulsa Odessa Houston Los Angeles St. Louis Toledo Richmond Baltimore

PIPE LINE HINTS



HOW TO—

Provide Efficient Rod Lubrication

Installing an oil cup above the rods on a reciprocating pump which was handling condensate saved about $100 per year per pump.

Before the lubricators were installed it was necessary to replace pump rods every two or three months. The lubricating value of the condensate handled by the pump was negligible and rods were quickly scored and pitted. After the lubricators were installed, life of pump rods was increased to about one year.

These lubricators can be installed for about one-fourth the cost of a new set of pump rods.

An oil cup is mounted on the pump body, and quarter-inch copper tubing is run from the cup almost touching the pump rod. A small hole is bored part way through the pump body and tapped for a quarter-inch pipe nipple. A smaller hole, sized to receive the copper tubing, is bored the rest of the way. The tubing is flared and pushed through the bored hole, with the flared end resting at the base of the tapped hole. The pipe nipple is then tightened against the flare, forming a tight seal. Tubing is extended directly above the rod so the oil will drop on the rod. Used engine oil is used for the lubricant and its rate of flow can be regulated from the oil cup.

The oil is applied freely on new packing until it is saturated, then cut back to just a drop at a itme.

A hole can be tapped in bottom of the pump body and the oil can be piped to a container and re-used if desired.

37th YEAR

SERVING THE OIL FIELD AND ASSOCIATED INDUSTRIES

IF WE DON'T HAVE IT— WE WILL MAKE IT

FIRST-CLASS MACHINE SHOP
MODERN MECHANIZED GRAY IRON FOUNDRY

WE SPECIALIZE IN . . .

- REBUILDING AND TESTING ENGINES • COMPRESSORS AND PUMPS
- NEW AND REBUILT OIL AND GAS FIELD SUPPLIES AND EQUIPMENT
- REPAIR AND REPLACEMENT OF ALL INDUSTRIAL EQUIPMENT

SUPPLIES · EQUIPMENT · REPAIRS

WE *can* FILL YOUR NEEDS

WRITE OR WIRE US, TODAY
PHONES 874 - 875

ACME FOUNDRY & MACHINE CO.

COFFEYVILLE • KANSAS

PRINTED FORMS FROM STOCK

☆

Immediate delivery of producing and pipe line forms made from our complete line . . . Write for completely illustrated catalog.

☆

GULF PUBLISHING CO.

P. O. Box 2608 Houston 1, Texas

World Supply and Demand

Increases 12 Percent Over Previous Year

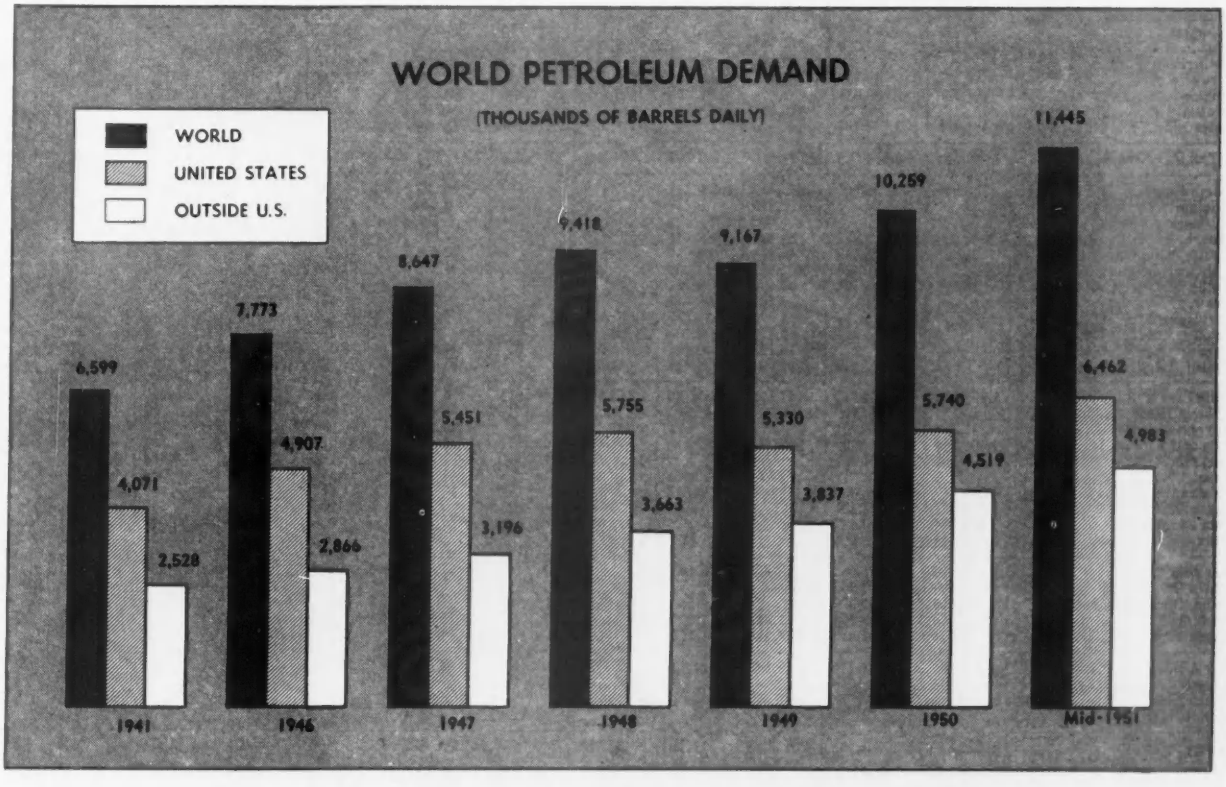
DEMAND for world oil rose in mid-1951 to a daily average of 11,444,516 barrels, 1,185,998 barrels more than the daily average reported for all of 1950, or a 12 percent hike. This compares favorably with the increase in 1950 of 14 percent from 1949, the greatest upsurge yet reported.

Western Europe, as in the previous year, recorded the greatest increase in oil products demand outside the U. S. Western European requirements, thanks to continuing industrial expansion, rose from 793,353 barrels a day in 1950 to 1,134,806 barrels in 1951. Except for Belgium and Denmark, all Western European countries contributed to the rising demand. France, Western Germany, Italy and Trieste, The Netherlands, and the United Kingdom recorded the greatest hikes in demand. Reason for the continuing trend, so marked during the previous year, was the expansion still riding the post-war crest of a more plentiful supply and accelerated efforts to produce and manufacture against the threat of possible war.

The differential between the mid-1951 daily world average production of 11,661,097 barrels and the daily average demand of 11,444,516 barrels, or 216,581 barrels, indicated an upsurge in petroleum products demand in view of the increase in daily average production of 1,260,574 barrels.

In North America, Canada and Cuba were net importers, while Mexico and the U. S. exported a total of 107,097 barrels a day. Canadian imports rose an average of 48,560 barrels a day in the face of continuing successful exploration. Lack of market facilities necessitated a large part of Canada's imports.

Mexico's exports, despite an increase in production of 11,203 barrels a day as compared to the previous



YEAR	U.S. Domestic	Outside U.S.	World Total
1938	3,115,000	2,127,000	5,272,000
1939	3,373,000	2,162,000	5,535,000
1940	3,625,000	1,838,000	5,463,000
1941	4,071,000	2,528,000	6,599,000
1946	4,907,000	2,866,000	7,773,000
1947	5,451,000	3,196,000	8,647,000
1948	5,755,000	3,663,000	9,418,000
1949	5,330,189	3,836,455	9,166,644
1950	5,739,362	4,519,156	10,258,518
Mid-1951	6,462,000	4,982,516	11,444,516

year, declined 11,884 barrels daily. This reflected a mounting domestic consumption and rising stock tank average. Production in the U. S. increased in July, 1951, 738,395 barrels a day over the previous year's daily average. At mid-year, U. S. demand was 321,290 barrels a day more than domestic supply. Imports of 546,452 barrels daily from Mexico, Venezuela and the Middle East supplied the difference.

Argentina, Brazil, Netherlands Antilles, Trinidad, and Uruguay consumed more crude than they produced. Bolivia, Chile, Colombia, Ecuador, Peru, and Venezuela produced more than they consumed.

The Middle East, with a mid-1951 daily average production of 1,878,742 barrels, exported 1,490,871 barrels daily, or almost 80 percent of its yield. Exports from this oil surplus region ranged high because of tremendous production and low domestic requirements. Iran and Kuwait, with combined daily average output at mid-1951 of 761,839 barrels, exported 642,774 barrels a day. Saudi Arabia, the Middle East's producing leader with 820,097 barrels daily, also was the area's largest single exported. Its daily exports averaged in mid-1951 637,549 barrels daily.

This Middle Eastern supply, temporarily in doubt during August when Anglo-Iranian Oil Company withdrew its operating personnel in the Iranian controversy, which still remains to be settled, is given a lion's share of the credit in aiding European industrial expansion, including a growing trend of "home refining."

World Supply and Demand, Crude Petroleum, by Countries

(Based on U. S. Bureau of Mines Monthly Report, "World Petroleum Statistics," Covering 1950 and July, 1951.)
(Actual Barrels Daily)

COUNTRY	PRODUCTION		IMPORTS		EXPORTS		CRUDE RUNS TO STILLS		OTHER DEMAND AND LOSSES		STOCK CHANGE	
	Bbls. Daily Year, 1950	Bbls. Daily July, 1951	Bbls. Daily Year, 1950	Bbls. Daily July, 1951	Bbls. Daily Year, 1950	Bbls. Daily July, 1951	Bbls. Daily Year, 1950	Bbls. Daily July, 1951	Bbls. Daily Year, 1950	Bbls. Daily July, 1951	Bbls. Daily Year, 1950	Bbls. Daily July, 1951
North America	5,679,789	6,508,677	716,433	823,097	139,479	107,097	6,189,786	7,005,516	75,271	71,387	— 8,315	+147,774
Canada	78,671	157,968	224,085	272,645	.....	.....	298,468	379,452	822	968	+ 3,466	+ 50,193
Cuba	329	322	5,460	4,000	.....	.....	5,499	6,000	.....	.....	+ 290	— 1,677
Mexico	198,474	209,677	.....	.....	44,142	32,258	146,457	158,064	6,540	6,451	+ 1,334	+ 12,903
Total N. America, Excl. U.S.	277,474	367,967	229,545	276,645	44,142	32,258	450,424	543,516	7,362	7,419	+ 5,090	+ 61,419
United States	5,402,315	6,140,710	486,888	546,452	95,337	74,839	5,739,362	6,462,000	67,909	63,968	—13,405	+ 86,355
South America and Caribbean	1,764,545	2,005,903	883,077	961,645	1,344,521	1,519,129	1,282,885	1,474,000	15,444	5,323	+ 4,773	— 30,903
Argentina	63,981	67,290	59,589	45,161	.....	.....	119,178	116,129	1,104	1,290	+ 3,288	— 4,968
Bolivia	1,688	1,322	.....	.....	148	161	1,701	968	8	.....	— 170	+ 194
Brazil	762	1,613	1,082	2,290	.....	.....	1,644	3,484	200	97	.....	+ 323
Chile	1,723	1,968	.....	.....	1,288	.....	.....	.....	41	32	+ 395	+ 1,936
Colombia	93,312	106,387	.....	.....	67,364	71,742	23,989	28,677	1,918	2,665	+ 41	+ 3,903
Ecuador	7,211	7,097	.....	.....	2,855	3,548	4,430	4,516	28	.....	— 101	— 968
Netherlands Antilles	.....	.....	776,088	841,129	18,534	.....	755,485	839,097	.....	.....	+ 2,068	+ 2,032
Peru	41,307	46,452	.....	.....	8,028	7,581	33,227	38,226	137	129	— 85	+ 516
Trinidad	56,526	56,581	31,164	57,742	6,707	6,323	80,573	94,161	411	129	.....	+ 13,710
Uruguay	.....	.....	15,154	15,323	.....	.....	14,603	15,323	.....	.....	+ 551	.....
Venezuela	1,498,035	1,717,193	.....	.....	1,239,597	1,429,774	248,055	333,419	11,597	1,581	— 1,214	— 47,581
Total Western Hemisphere	7,444,334	8,514,580	1,599,510	1,784,742	1,484,000	1,626,226	7,472,671	8,479,516	90,715	76,710	— 3,542	+116,871
Western Europe	38,666	48,065	752,452	1,070,774	175	322	793,353	1,134,806	1,154	1,290	— 3,564	— 17,581
Belgium	.....	.....	8,973	5,871	.....	322	9,000	8,355	.....	.....	— 27	— 2,807
Denmark	.....	.....	636	.....	.....	.....	605	322	.....	.....	+ 30	— 323
France	2,490	6,097	284,534	367,548	175	.....	292,436	360,581	387	323	— 5,973	+ 12,742
Western Germany	21,655	26,516	44,438	66,032	.....	.....	65,471	94,613	164	322	+ 458	— 2,387
Italy and Trieste	173	420	102,647	144,355	.....	.....	101,578	153,806	137	161	+ 1,104	— 9,194
Netherlands	13,416	14,129	95,493	119,452	.....	.....	111,425	131,710	137	161	— 2,652	+ 1,710
Norway	.....	.....	364	1,452	.....	.....	252	484	.....	.....	+ 112	+ 968
Portugal	.....	.....	5,378	12,387	.....	.....	5,819	7,258	.....	.....	— 441	+ 5,129
Spain	.....	.....	5,775	9,064	.....	.....	5,507	7,226	.....	.....	+ 269	+ 1,839
Sweden	.....	.....	18,123	20,161	.....	.....	17,808	18,064	.....	.....	+ 315	+ 2,097
United Kingdom	932	903	186,091	324,452	.....	.....	183,452	352,387	329	323	+ 3,241	— 27,355
Middle East	1,801,025	1,878,742	141,476	180,710	1,033,345	1,490,871	873,814	591,355	9,003	6,161	+26,340	— 28,935
Bahrein Island	30,181	30,129	126,814	148,065	.....	.....	155,890	192,323	268	548	+ 836	— 14,677
Egypt	44,858	45,451	.....	.....	.....	.....	45,501	46,806	206	322	— 849	— 1,677
Iran and Kuwait	1,008,759	761,839	.....	.....	455,715	642,774	545,121	151,613	4,822	710	+ 3,101	— 33,258
Iraq	136,764	173,387	.....	.....	126,298	163,129	7,767	7,742	2,699	2,516	.....	.....
Israel	.....	.....	4,575	20,968	.....	.....	4,197	17,258	.....	.....	+ 378	+ 3,709
Lebanon	.....	.....	10,087	11,677	.....	.....	10,088	11,677	.....	.....	.....	.....
Qatar	33,611	47,484	.....	.....	32,055	47,419	.....	.....	301	65	+ 1,255	.....
Saudi Arabia	546,704	820,097	.....	.....	419,277	637,549	105,107	163,936	701	1,645	+21,619	+ 16,968
Turkey	148	355	.....	.....	.....	.....	143	.....	6	355	.....	.....
Other Asia	16,214	21,065	28,348	63,677	.....	.....	41,389	76,968	649	258	+ 2,523	+ 7,516
China	2,000	2,000	.....	.....	.....	.....	1,918	1,936	82	64	.....	.....
India, Burma and Pakistan	8,540	11,677	.....	.....	.....	.....	8,082	11,613	458	65	.....	.....
Formosa	63	65	1,937	15,903	.....	.....	2,000	6,290	.....	.....	.....	+ 9,677
Japan	5,611	7,323	26,411	47,774	.....	.....	29,389	57,129	109	129	+ 2,523	— 2,161
Other Africa	901	1,710	16,192	17,936	.....	.....	16,636	20,871	93	32	+ 364	— 1,258
Algeria	66	.....	.....	.....	.....	.....	.....	.....	66	.....	.....	.....
Canary Islands	.....	.....	16,192	17,936	.....	.....	15,828	19,194	.....	.....	+ 364	— 1,258
French Morocco	835	1,710	.....	.....	.....	.....	808	1,677	27	32	.....	.....
Oceania	222,233	261,935	14,959	11,484	30,959	38,710	205,860	231,000	975	3,355	— 603	+ 355
Australia	6	.....	14,959	11,484	.....	.....	14,959	15,000	5	.....	.....	— 3,516
British Borneo	84,816	102,709	.....	.....	30,959	38,710	190,901	216,000	951	3,355	— 603	+ 3,871
Indonesia	137,392	159,226	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Zealand	19	.....	.....	.....	.....	.....	.....	.....	19	.....	.....	.....
Total Above Countries	9,523,373	10,726,097	2,552,937	3,129,323	2,548,479	3,156,129	9,403,723	10,534,516	102,589	87,806	+21,518	+ 76,968
U.S.S.R. and Eastern Europe	877,150	935,000	2,000	2,000	.....	.....	854,795	910,000	24,356	27,000	.....	.....
U.S.S.R.	748,493	800,000	.....	.....	.....	.....	726,028	775,000	22,466	25,000	.....	.....
Other Eastern Europe	128,657	135,000	2,000	2,000	.....	.....	128,767	135,000	1,890	2,000	.....	.....
Total Eastern Hemisphere	2,956,189	3,146,517	955,427	1,346,581	1,064,479	1,529,903	2,785,847	2,965,000	36,230	38,096	+25,060	— 39,903
Total World Outside U.S.	4,998,208	5,520,387	2,068,049	2,584,871	2,453,142	3,081,290	4,519,156	4,982,516	59,036	50,838	+ 8,113	— 9,387
WORLD TOTAL	10,400,523	11,661,097	2,554,937	3,131,323	2,548,479	3,156,129	10,258,518	11,444,516	126,945	114,806	+21,518	+ 76,968

Something you can't see makes a BIG difference!

New SLYDEZE SLIPS practically eliminate slip-to-cone friction in Lane-Wells Packers

SLYDEZE SLIPS are helping to reduce the dangers of stuck packers, because they slide easily under all service conditions. A special coating, permanently bonded to the back of the slips, gives an ever-lubricated surface which practically eliminates slip-to-cone friction.

Since as much as 25% of the force required to "unset" a packer goes directly into overcoming the usual slip-to-cone friction, it's easy to see the value of this new improvement. Easy to see, also, why reports from users in the field are enthusiastic about SLYDEZE SLIPS.

LANE WELLS

Tomorrow's Tools-Today!

Ask Your Lane-Wells Man!

General Offices, Export Office and Plant • 5610 So. Soto St. Los Angeles 58, California

Los Angeles • Houston • Oklahoma City
Lane-Wells Canadian Co. in Canada
Petro-Tech Service Co. in Venezuela

AP-419

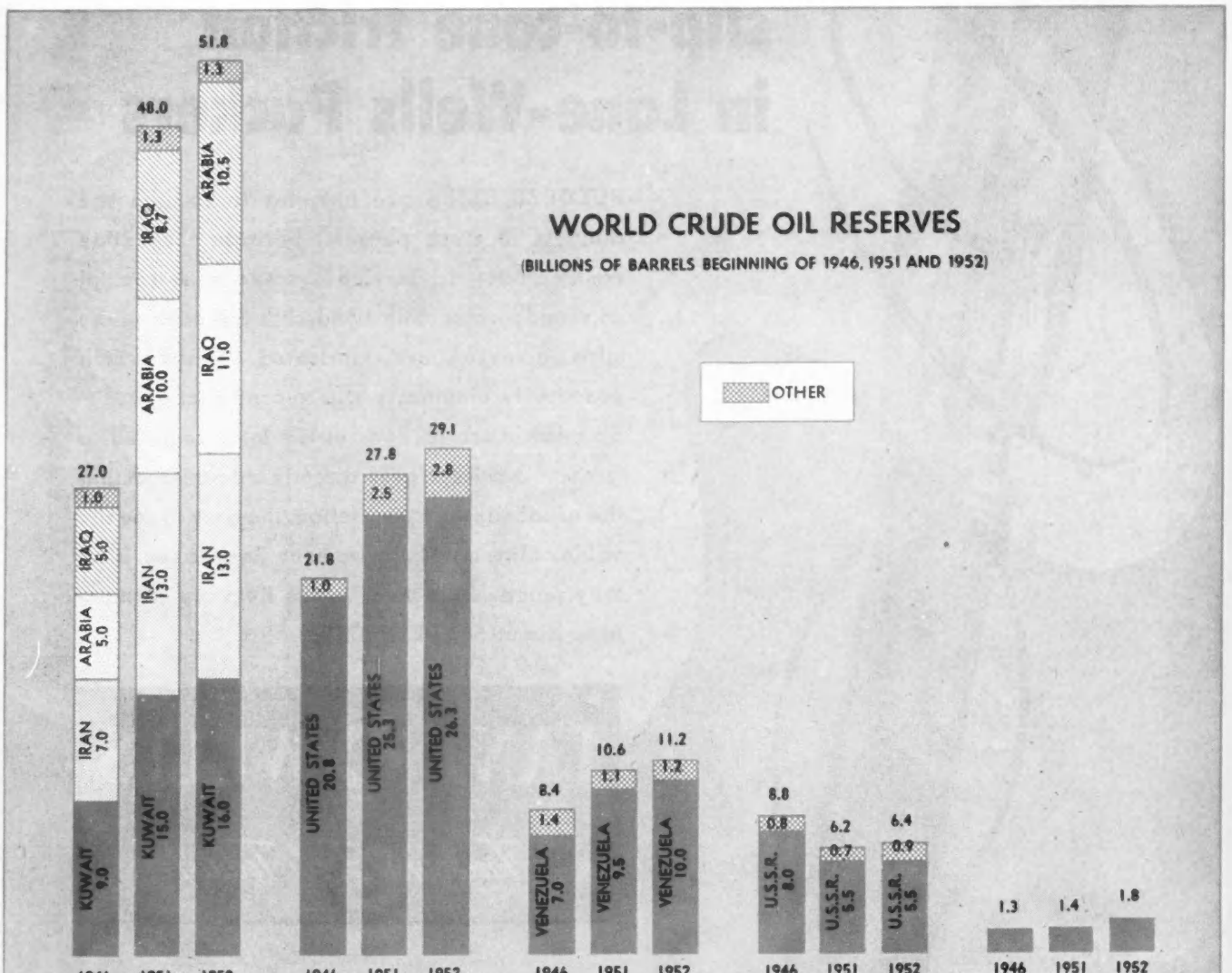
World Crude Reserves

Pass 100 Billion Barrels

WORLDWIDE exploration, on the highest level in 1951 since World War II, pushed total proven crude reserves over the 100-billion-barrel mark for the first time. Total reserves for the world at the beginning of 1952 are estimated by WORLD OIL to be 100,477,560,000 barrels, representing a gain of more than 6 billion barrels over last year, or an increase of 6.6 percent. The largest net gains were made in the Middle East countries, the U. S., and in Venezuela.

The Middle East, with a year-end total reserve of 51,825,000,000 barrels, now possesses 51.58 percent of the world's reserves. It was here that the largest net gain in reserves was made. During the past year, the Middle East countries found 3,815,000,000 barrels more new oil than its production of 693,551,000 barrels. Therefore, the total new oil proven last year in this area amounted to 4,508,551,000 barrels, to exceed the volume of oil found anywhere else on the globe.

At the end of 1951, the U. S. had a crude reserve of 26,308,610,000 bar-



rels, making a net gain over the previous year of 1,040,212,000 barrels. During last year the U. S. produced 55.66 percent of the world's total production, or 2,368,983,000 barrels, which when added to the net gain in reserves for the year means a total of 3,284,616,000 barrels of new oil was found in this country during 1951.

Venezuela is credited with the discovery of 1,122,293,000 barrels of new oil in 1951, ½ million more than its production of 622,293,000 barrels. Consequently, Venezuela's proven reserves at the beginning of 1952 is estimated to total about 10 billion barrels.

Iraq Increase

Of the Middle East countries, Iraq showed the largest volume of new oil found last year. This increase was due to an intensified drilling program to prepare for the extra production that will be placed on stream in 1952. A total of 1,860,951,000 barrels of oil was reported proven in 1951, while Iraq produced 60,951,000 barrels, making 10,500,000,000 barrels of total proven reserves at the beginning of 1952, compared to a total of 8,700,000,000 barrels at the end of 1950.

Saudi Arabia, largest crude producer in the Middle East, ended 1951 with an estimated 11 billion barrels, compared to 10 billion for the previous year. Two discoveries were made there in 1951, bringing new oil proven during the year to 1,276,313,000 barrels.

Kuwait, with the largest oil reserves of any Middle East country, ended 1951 with total proven reserves estimated at 16 billion. This represents a net gain of 1 billion barrels over the same period in the previous year. Kuwait produced 203,824,000 barrels to show a total of 1,203,824,000 barrels of new oil found last year.

Canada showed a big gain in oil reserves for the year. Totals reported at the end of 1951 showed 1,400,000,000 barrels, a gain of 200 million barrels over the 1950 figures. During the year, Canada produced 47,834,000 barrels, bringing total new oil proven during the year to 247,834,000 barrels. Practically all of this was found in Western Canada, where 108 discoveries were made, of which 40 were oil strikes. Wizard Lake was the largest 1951 discovery with an estimated reserve of 100 million barrels.

During the past year five new oil fields and one gas field were discovered in Mexico. New fields are the Jose Colomo in Tabasco; the Rabon Grande and Concepcion oil fields in Southern Veracruz in the Isthmus Zone; Trevino oil field and the Lomitas gas field in the state of Tamaulipas near the Texas border in the Northeast Zone; and Tamiahua oil field in the state of Veracruz in the North Zone.

Of the five fields, the Jose Colomo field is regarded as the most significant. Reserves proven to date have been estimated at more than a quarter of a billion barrels. The discovery well, Jose Colomo 1, was drilled to 5576 feet and produces from the Lower Amate sand of Miocene age. It was completed April 21, 1951, with an initial daily production of 1195 barrels of oil and 500,000 cubic feet of gas. Reserves of the Rabon Grande field are estimated by the Mexican American Independent Oil Company at more than 50 million barrels. This field is near the port of Coatzacoalcos.

Order Your Copy of 1951 World Oil Index

The complete editorial index covering all issues of WORLD OIL published during 1951 has been prepared and is bound separately in convenient pamphlet form. It will be sent free to all subscribers who write requesting copies.

Orders should be addressed immediately to the Circulation Department, Box 2608, Houston 1, Texas, as quantities are limited.

Estimated World Crude Oil Reserves, By Countries

(THOUSANDS OF BARRELS)

CONTINENT and COUNTRY	ESTIMATED RESERVES		ANNUAL PRODUCTION		Ratio of Reserves to Annual Prod. (Years' Supply)
	Thousand Barrels Jan. 1, 1952	Percent of World	Thousand Bbls. in 1951	Percent of World	
North America	**29,089,110**	**28.95**	**2,368,983**	**55.66**	**12.3**
Alaska	500	0.00	.....	0.00	00.0
Canada	1,400,000	1.39	47,834	1.13	29.3
Cuba	2,000	0.00	118	0.00	16.9
Mexico	1,378,000	1.37	76,627	1.80	18.0
*United States	26,308,610	26.19	2,244,404	52.73	11.7
South America	**11,229,000**	**11.17**	**728,023**	**17.10**	**15.4**
Argentina	300,000	0.30	25,725	0.61	11.7
Bolivia	10,000	0.01	529	0.01	18.9
Brazil	25,000	0.03	536	0.01	46.6
Chile	30,000	0.03	759	0.02	39.5
Colombia	400,000	0.40	38,826	0.91	10.3
Ecuador	30,000	0.03	2,628	0.06	11.4
Peru	175,000	0.17	16,253	0.38	10.8
Trinidad	250,000	0.25	20,474	0.48	12.2
Venezuela	10,000,000	9.95	622,293	14.62	16.1
Europe	**6,375,800**	**6.34**	**342,457**	**8.05**	**18.6**
Albania	21,000	0.02	2,078	0.05	10.1
Austria	135,000	0.14	13,454	0.32	10.0
Czechoslovakia	2,500	0.00	270	0.01	9.3
France	30,000	0.03	2,009	0.05	15.0
Germany, West	250,000	0.25	9,389	0.22	26.6
Great Britain	3,300	0.00	327	0.01	10.1
Hungary	30,000	0.03	3,012	0.07	10.1
Italy	3,000	0.00	102	0.00	29.4
Netherlands	50,000	0.05	5,039	0.12	9.9
Poland	11,000	0.01	890	0.02	12.4
Roumania	335,000	0.33	30,864	0.72	10.9
U. S. S. R. (Russia)	5,500,000	5.47	274,480	6.45	20.0
Yugoslavia	5,000	0.01	543	0.01	9.2
Africa	**169,050**	**0.17**	**16,990**	**0.40**	**9.9**
Algeria	50	0.00	4	0.00	12.5
Egypt	164,000	0.16	16,417	0.39	10.0
Morocco, French	5,000	0.01	569	0.01	8.8
Asia, Total	**53,623,500**	**53.37**	**799,878**	**18.79**	**67.0**
Asia, Middle East	**51,825,000**	**51.58**	**693,551**	**16.29**	**74.7**
Bahrein	300,000	0.30	11,008	0.26	27.3
Iran (Persia)	13,000,000	12.94	123,633	2.90	105.1
Iraq	10,500,000	10.45	60,951	1.43	172.3
Kuwait	16,000,000	15.92	203,824	4.79	78.5
Qatar	1,000,000	1.00	17,719	0.42	56.4
Saudi Arabia	11,000,000	10.95	276,313	6.49	39.8
Turkey	25,000	0.02	103	0.00	242.7
Asia, Far East	**1,798,500**	**1.79**	**106,327**	**2.50**	**16.9**
Borneo, British (Sarawak and Brunei)	500,000	0.50	37,430	0.88	13.4
Burma	48,000	0.05	754	0.02	63.7
India	25,000	0.02	1,900	0.04	13.2
Pakistan	20,000	0.02	1,505	0.04	13.2
China	10,000	0.01	728	0.02	13.7
Formosa	500	0.00	24	0.00	20.8
Japan	30,000	0.03	2,502	0.06	12.0
Indonesia	1,100,000	1.10	54,953	1.29	20.0
Sakhalin	65,000	0.06	6,531	0.15	10.0
Australia—New Zealand	**100**	.....	**7**	**0.00**	**14.3**
Total, World	**100,477,560**	**100.00**	**4,256,338**	**100.00**	**23.6**

* U. S. crude oil only; not including natural gas liquids.

World Crude Production

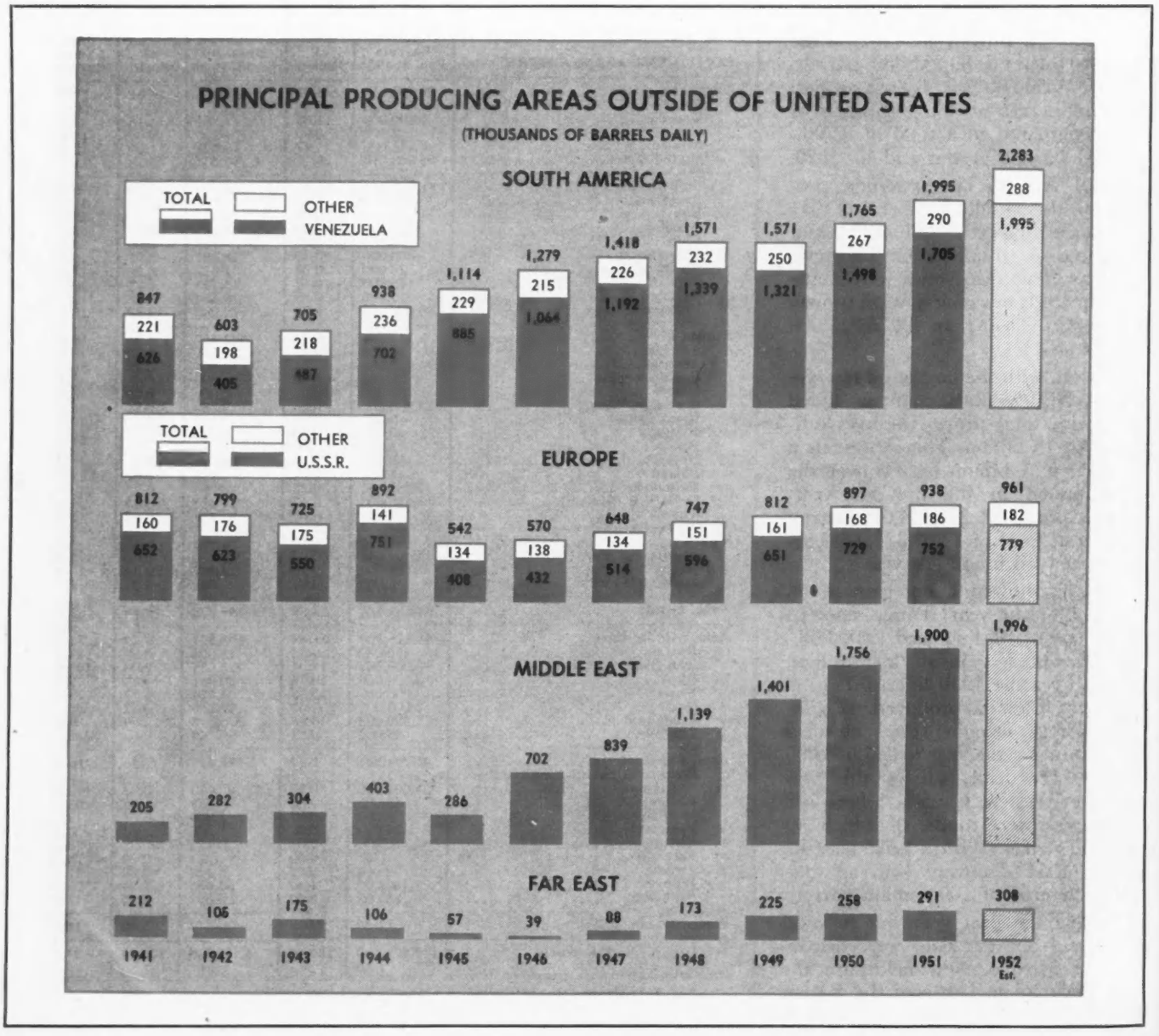
to Rise Another 1/4 Million Barrels

WORLD crude production entered the second half of the 20th century by surpassing all previous records. And indications were that 1952 will record no leveling off. Reflecting a rise of 12.1 percent during the calendar year, 1951 world output was 4,256,338,000 barrels, 459,680,000 barrels more than the previous record year of 1950. Estimates for 1952 global output presage a further rise, of 250,707,000 barrels, to 4,507,045,000 barrels.

Last year's record was built on daily average production of 11,661,200 barrels, and the forecast for 1952 is predicated on an expected daily yield of 12,314,300 barrels. In 1950 the daily average climbed above the 10 million barrels a day figure for the first time, reaching 10,401,800 barrels.

Hand in hand with rising production was rising demand, stemming largely from an uncertain international situation whose overtones of unrest, turmoil and actual threat of war carried over into the year from 1950. Record flow of oil was channeled into domestic consumption, which rose sharply; stockpiling by many nations to circumvent shortages should war break out; and the Korean conflict.

Loss of Iran's huge oil production, which in May, 1951, reached 731,793 barrels daily, created a flurry of apprehensive excitement throughout not



only the oil circles of the world but also governmental and economic spheres.

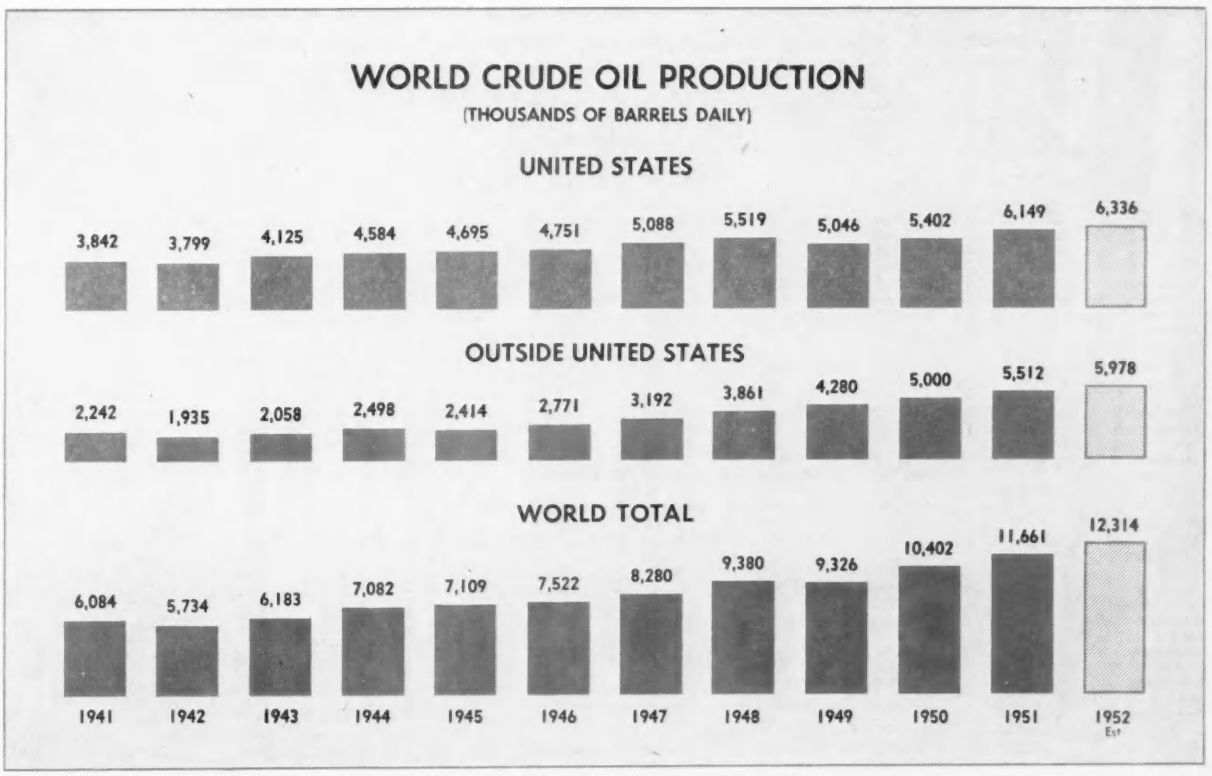
"How will we replace all that oil in the world market?" was a question on many lips. The West bombarded Iran with diplomats whose efforts to salve the Iranian nationalists failed miserably. Premier Mossadegh, pushed to the fore by his country's political leaders, refused to budge. Iran wanted complete control of its oil industry.

Anglo-Iranian Oil Company, largely owned by the British government, relinquished its locks, stocks and barrels during the summer. Iran succeeded, but was immediately confronted with the problem of what to do with the oil. As the year closed, no answer had been found.

But the Western nations had found the answer to their question. The Middle East. As Iranian production diminished, Iraq, Kuwait, Qatar, and Saudi Arabia lessened the impact on world markets by increased production.

Iraq's output for 1951 rose 11,032,000 barrels over its production for the previous year, an increase of 22.1 percent. Kuwait, land of the proud sailors, produced 203,824,000 barrels, reflecting a rise over 1950 of 62.1 percent. Qatar production rose 44.4 percent to 17,719,000 barrels. Saudi Arabia, which supplanted Iran in 1951 as the Middle East's major producer, accounted for 276,313,000 barrels, 38.5 percent more than its 1950 yield of 199,547,000 barrels and 6.49 percent of the world's production for the year.

Offsetting the Iranian thorn in the side of world oil in 1951 was Canada, which, with U. S., Cuba and Mexico, formed the world's Number 1 producing area. With an unprecedented expansion, the northern neighbor of the U. S. increased its production from 29,146,000 barrels in 1950 to 47,834,000 barrels in 1951, or 64.1 percent. Current potential productive capacity of 200,000 barrels a day awaited only market facilities. Western Canada is believed to have proven crude reserves of approximately 1.4 billion barrels, most of which lie in Alberta Even this figure is expected to receive an upward revision as development work progresses in potentially signifi-



(All Figures in Barrels)

YEAR	WORLD		UNITED STATES		OUTSIDE U.S.A.		YEAR	WORLD		UNITED STATES		OUTSIDE U.S.A.	
	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average		Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average
1918	503,515,000	1,378,000	355,928,000	975,000	147,587,000	403,000	1936	1,791,540,000	4,908,000	1,099,687,000	3,013,000	691,853,000	1,895,000
1919	555,875,000	1,523,000	378,367,000	1,037,000	177,508,000	486,000	1937	2,039,231,000	5,587,000	1,279,160,000	3,505,000	760,071,000	2,082,000
1920	688,884,000	1,887,000	442,929,000	1,213,000	245,955,000	674,000	1938	1,988,041,000	5,446,000	1,214,355,000	3,327,000	773,686,000	2,119,000
							1939	2,086,160,000	5,715,500	1,264,962,000	3,465,600	821,198,000	2,249,900
1921	766,002,000	2,098,000	472,183,000	1,294,000	293,819,000	804,000	1940	2,149,821,000	5,873,800	1,353,214,000	3,697,300	796,607,000	2,176,500
1922	858,898,000	2,353,000	557,531,000	1,528,000	301,367,000	825,000							
1923	1,015,736,000	2,783,000	732,407,000	2,007,000	283,329,000	776,000	1941	2,220,657,000	6,084,000	1,402,228,000	3,841,700	818,429,000	2,242,300
1924	1,014,318,000	2,779,000	713,940,000	1,956,000	300,378,000	823,000	1942	2,093,100,000	5,734,500	1,386,645,000	3,799,000	706,455,000	1,935,500
1925	1,068,933,000	2,928,000	763,743,000	2,092,000	305,190,000	836,000	1943	2,256,637,000	6,182,600	1,505,613,000	4,124,900	751,034,000	2,057,700
							1944	2,592,289,000	7,082,700	1,677,904,000	4,584,400	914,385,000	2,498,300
1926	1,096,823,000	3,005,000	770,874,000	2,112,000	325,949,000	893,000	1945	2,594,697,000	7,108,700	1,713,655,000	4,694,900	881,042,000	2,413,800
1927	1,262,582,000	3,459,000	901,129,000	2,469,000	361,453,000	990,000							
1928	1,324,774,000	3,629,000	901,474,000	2,469,000	423,300,000	1,160,000	1946	2,745,430,000	7,521,700	1,733,939,000	4,750,500	1,011,491,000	2,771,200
1929	1,485,867,000	4,071,000	1,007,323,000	2,760,000	478,544,000	1,311,000	1947	3,022,075,000	8,279,600	1,856,987,000	5,087,600	1,165,088,000	3,192,000
1930	1,410,037,000	3,863,000	898,011,000	2,460,000	512,026,000	1,403,000	1948	3,433,213,000	9,380,300	2,020,185,000	5,519,600	1,413,028,000	3,860,700
							1949	3,404,099,000	9,326,200	1,841,940,000	5,046,400	1,562,159,000	4,279,800
1931	1,372,532,000	3,760,000	851,081,000	2,332,000	521,451,000	1,428,000	1950	3,796,658,000	10,401,800	1,971,845,000	5,402,300	1,824,813,000	4,999,500
1932	1,309,677,000	3,588,000	785,159,000	2,151,000	524,518,000	1,437,000							
1933	1,442,146,000	3,951,000	905,656,000	2,481,000	536,490,000	1,470,000	1951	4,256,338,000	11,661,200	2,244,404,000	6,149,100	2,011,934,000	5,512,100
1934	1,522,281,000	4,170,000	908,065,000	2,488,000	614,216,000	1,682,000	1952 est.	4,507,045,000	12,314,300	2,319,000,000	6,436,100	2,188,045,000	5,978,200
1935	1,654,488,000	4,532,000	996,596,000	2,730,000	657,892,000	1,802,000							

cant reef and Viking sand discoveries.

The U. S., with a huge production in 1950 of 1,971,845,000 barrels, increased its output 13.8 perecnt to 2,244,404,000 barrels, or 52.73 percent of the entire world yield. While Cuba production slipped 24.5 percent, to 118,000 barrels, Mexico increased its total from 72,443,000 barrels to 76,627,000 barrels, a 5.8 percent hike.

Venezuela again led the way among South American producers with 622,293,000 barrels, or 75,510,000 barrels more than the previous year. With a 1951 yield of 25,725,000 barrels, Argentina upped its production 10.2 percent as compared with 1950, and established itself as the No. 2 oil producer in South America for the year.

Production drops in Bolivia, Ecuador and Trinidad were more than offset by increases in Brazil, Chile, Colombia and Peru, in addition to Venezuela and Argentina, to reflect a 13 percent rise for South America's over-all 1951 oil production. The area's slice of world production rose in 1951 to 17.1 percent from 16.96 percent the previous year.

Europe, boosted by Russian production of 274,480,000 barrels, reached a total output of 342,457,000 barrels, a rise of 4.6 percent from 1950. Satellite oil, produced in Albania, Austria, Czechoslovakia, Hungary, Poland, and Roumania rose from 46,180,000 barrels in 1950 to 50,568,000 barrels in 1951.

Nearly an even keel was reported on African oil output. Algeria, Egypt and Morocco combined to produce 16,990,000 barrels in 1951, as compared to 16,702,000 barrels the previous year.

The Far East increased its oil yield 13.1 percent in 1951 to 106,327,000 barrels. Indonesia, with a moderate increase of 9.6 percent over 1950, easily led this producing area. Indonesian production of 54,953,000 barrels during 1951 was 17,523,000 barrels ahead of its nearest competitor. British Borneo (Sarawak and Brunei) produced 37,430,000 barrels, a 20.9 percent rise from 1950. Burma, India, Pakistan, China, Formosa (Taiwan), Japan, and Sakhalin joined the Far Eastern leaders to give that area a 2.5 percent share in 1951 world production.

(See tables on pages 266, 270, 272.)

Trends in World Crude Oil Production, by Countries, and Cumulative Production Through 1951

(Sources: U. S. Bureau of Mines except 1951 from private sources or estimated by World Oil)

CONTINENT and COUNTRY	ANNUAL PRODUCTION (Thousands of Barrels)		DAILY AVERAGE PRODUCTION (Actual Barrels)			YEAR'S PRODUCTION Percent of World		CUMULATIVE PRODUCTION TO January 1, 1952 (Thousands of Barrels)	
	1950	1951	1950	1951	'50-'51 % Diff.	1950	1951	Total	As % of World
North America	**2,073,590**	**2,368,983**	**5,681,069**	**6,490,364**	**+ 14.2**	**54.62**	**55.66**	**45,962,558**	**65.84**
Canada	29,146	47,834	79,852	131,052	+ 64.1	0.77	1.13	239,415	0.34
Cuba	156	118	428	323	— 24.5	.....	.....	2,399	.....
Mexico	72,443	76,627	198,474	209,937	+ 5.8	1.91	1.80	2,558,981	3.67
United States	1,971,845	2,244,404	5,402,315	6,149,052	+ 13.8	51.94	52.73	43,161,763	61.83
South America	**644,059**	**728,023**	**1,764,545**	**1,994,584**	**+ 13.0**	**16.96**	**17.10**	**8,112,776**	**11.62**
Argentina	23,353	25,725	63,981	70,480	+ 10.2	0.61	0.61	483,895	0.69
Barbadoes	.....	.....	.....	.....	.....	.....	.....	8	.....
Bolivia	616	529	1,688	1,449	— 14.2	0.01	0.01	6,116	0.01
Brazil	278	536	762	1,469	+ 92.8	0.01	0.01	1,454	.....
Chile	629	759	1,723	2,079	+ 20.7	0.02	0.02	1,388	.....
Colombia	34,059	38,826	93,312	106,373	+ 14.0	0.90	0.91	543,840	0.78
Ecuador	2,632	2,628	7,211	7,200	— 0.2	0.07	0.06	51,658	0.08
Peru	15,077	16,253	41,307	44,529	+ 7.8	0.40	0.38	417,807	0.60
Trinidad	20,632	20,474	56,526	56,093	— 0.8	0.54	0.48	433,571	0.62
Venezuela	546,783	622,293	1,498,035	1,704,912	+ 13.8	14.40	14.62	6,173,039	8.84
Europe	**327,273**	**342,457**	**896,638**	**938,238**	**+ 4.6**	**8.62**	**8.05**	**8,726,849**	**12.50**
Albania	2,335	2,078	6,397	5,693	— 11.0	0.06	0.05	19,775	0.03
Austria	6,150	13,454	16,849	36,860	+118.8	0.16	0.32	77,525	0.11
Czechoslovakia	292	270	800	740	— 7.5	0.01	0.01	4,995	0.01
France	909	2,009	2,491	5,504	+121.0	0.03	0.05	17,322	0.02
Germany	7,904	9,389	21,655	25,723	+ 18.8	0.21	0.22	116,040	0.17
Great Britain	340	327	932	896	— 3.9	0.01	0.01	5,137	0.01
Hungary	4,198	3,012	11,501	8,252	— 28.3	0.11	0.07	53,274	0.08
Italy	63	102	173	280	+ 61.8	.....	.....	3,656	0.01
Netherlands	4,897	5,039	13,416	13,805	+ 2.9	0.13	0.12	19,660	0.03
Poland	1,205	890	3,301	2,438	— 26.2	0.03	0.02	280,788	0.40
Roumania	32,000	30,864	87,671	84,559	— 3.6	0.84	0.72	1,288,450	1.84
U. S. S. R. (Russia)	266,200	274,480	729,315	752,000	+ 3.1	7.01	6.45	6,837,228	9.79
Yugoslavia	780	543	2,137	1,488	— 32.3	0.02	0.01	2,999	.....
Africa	**16,702**	**16,990**	**45,759**	**46,548**	**+ 1.7**	**0.44**	**0.40**	**170,921**	**0.24**
Algeria	24	4	66	11	— 83.3	.....	.....	182	.....
Egypt	16,373	16,417	44,857	44,978	+ 0.3	0.43	0.39	169,292	0.24
Morocco	305	569	836	1,559	+ 86.5	0.01	0.01	1,447	.....
Asia, Total	**735,025**	**799,878**	**2,013,767**	**2,191,447**	**+ 8.8**	**19.36**	**18.79**	**6,839,704**	**9.80**
Asia, Middle East	**641,001**	**693,551**	**1,756,167**	**1,900,140**	**+ 8.2**	**16.88**	**16.29**	**4,708,583**	**6.75**
Bahrein	11,016	11,008	30,181	30,159	— 0.1	0.29	0.26	131,924	0.19
Iran	242,475	123,633	664,315	338,721	— 49.0	6.39	2.90	2,509,486	3.60
Iraq	49,919	60,951	136,765	166,989	+ 22.1	1.31	1.43	553,063	0.79
Kuwait	125,722	203,824	344,443	558,422	+ 62.1	3.31	4.79	488,202	0.70
Qatar	12,268	17,719	33,611	48,545	+ 44.4	0.32	0.42	30,737	0.04
Saudi Arabia	199,547	276,313	546,704	757,022	+ 38.5	5.26	6.49	994,919	1.43
Turkey	54	103	148	282	+ 90.5	.....	.....	252	.....
Asia, Far East	**94,024**	**106,327**	**257,600**	**291,307**	**+ 13.1**	**2.48**	**2.50**	**2,131,121**	**3.05**
Borneo, British (Sarawak and Brunei)	30,958	37,430	84,816	102,548	+ 20.9	0.82	0.88	252,272	0.36
Burma	450	754	1,233	2,066	+ 67.6	0.01	0.02		
India	1,867	1,900	5,115	5,205	+ 1.8	0.05	0.04	346,716	0.50
Pakistan	800	1,505	2,192	4,123	+ 88.1	0.02	0.04		
China	730	728	2,000	1,995	— 0.3	0.02	0.02	5,485	0.01
Formosa (Taiwan)	23	24	63	66	+ 4.8	.....	.....	332	.....
Japan	2,048	2,502	5,611	6,855	+ 22.2	0.05	0.06	100,947	0.14
Indonesia	50,148	54,953	137,392	150,556	+ 9.6	1.32	1.29	1,324,598	1.90
Sakhalin	7,000	6,531	19,178	17,893	— 6.7	0.19	0.15	100,771	0.14
Australia-New Zealand	9	7	25	19	— 24.0	.....	.....	67	.....
World, Undistributed	.....	.....	.....	.....	.....	.....	.....	1,044	.....
TOTAL WORLD	**3,796,658**	**4,256,338**	**10,401,803**	**11,661,200**	**+ 12.1**	**100.00**	**100.00**	**69,813,919**	**100.00**

the A-1 answer to

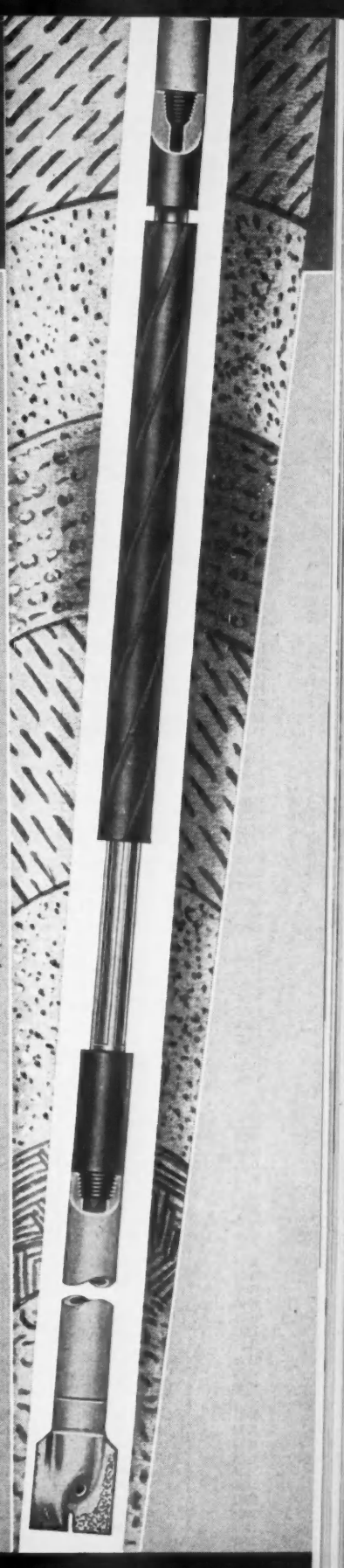
Key Seat trouble

REDUCE DRILLING COSTS

by using

BURRIS KEY SEAT WIPER

Positively Prevents Sticking in Key Seats



A-1 BIT AND TOOL COMPANY

2000 HUSSION STREET • BOX 2133 • CHarter 7611 • HOUSTON

DISTRICT OFFICES AND SERVICE POINTS:

TEXAS
Corpus Christi
Victoria
Longview
Beaumont
Midland

MISSISSIPPI

LOUISIANA
Lafayette
Houma
New Orleans
Lake Charles

CALIFORNIA
Los Angeles

ILLINOIS
Olney

WYOMING
Casper
Baash-Ross Tool Co.
(Sidewall Coring,
Casing Milling
and Side Tracking

OKLAHOMA
Oklahoma City

CANADIAN REPRESENTATIVE:
Core Laboratories
Inc.
Calgary and

EXPORT REPRESENTATIVES:

SOUTH AMERICA:
C. R. Summers.
Scandia Hotel.
Maracaibo,
Venezuela

NEW YORK, N. Y.
Daniels, Beckley
and Associates
30 Rockefeller Plaza

Langley y Cia.
Carrientes 1115
Buenos Aires

NEAR & FAR EAST
W. O. Calvert
Cobham Way,
East Horsley,
Surrey, England

MEXICO
J. E. Douglas
2nd Natl. Bank Bldg.
Houston, Texas

World Crude Oil Production, By Countries, By Years (Part 1)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources and Minerals Yearbook*, except as otherwise indicated)

YEAR	WORLD TOTAL	Percent Produced by U.S.	NORTH AMERICA					SOUTH AMERICA										
			Canada	Mexico	United States	Cuba	Total North America	Argentina	Barbados	Bolivia	Brazil	Chile	Colombia	Ecuador	Peru	Trinidad	Venezuela	Total South America
1857	2																	
1858	4																	
1859	6	31			2		2											
1860	509	98			500		500											
1861	2,131	99			2,114		2,114											
1862	3,092	99	12		3,057		3,069											
1863	2,763	94	83		2,611		2,694											
1864	2,304	92	90		2,116		2,206											
1865	2,716	92	110		2,498		2,608											
1866	3,899	92	175		3,598		3,773											
1867	3,709	90	190		3,347		3,537											
1868	3,990	91	200		3,646		3,846											
1869	4,696	90	220		4,215		4,435											
1870	5,799	91	250		5,261		5,511											
1871	5,730	91	270		5,205		5,475											
1872	6,877	92	308		6,293		6,601											
1873	10,838	91	365		9,894		10,259											
1874	11,933	92	169		10,927		11,096											
1875	9,977	88	220		8,788		9,008											
1876	11,051	83	312		9,133		9,445											
1877	15,754	85	312		13,350		13,662											
1878	18,417	84	312		15,397		15,709											
1879	23,601	84	575		19,914		20,489											
1880	30,018	88	350		26,286		26,636											
1881	31,993	86	275		27,661		27,936											
1882	35,704	85	275		30,350		30,625											
1883	30,255	78	250		23,450		23,700											
1884	35,969	67	250		24,218		24,468											
1885	26,765	59	250		21,859		22,109											
1886	47,243	59	584		28,065		28,649											
1887	47,807	59	526		28,283		28,809											
1888	52,165	53	695		27,612		28,307											
1889	61,507	57	705		35,164		35,869											
1890	76,633	60	795		45,824		46,619											
1891	91,100	60	755		54,293		55,048											
1892	88,739	57	780		50,515		51,295											
1893	92,038	53	798		48,431		49,229											
1894	89,337	55	829		49,344		50,173											
1895	103,692	51	726		52,892		53,618											
1896	114,199	53	727		60,960		61,687								47			47
1897	121,992	50	710		60,476		61,186								71			71
1898	124,979	44	758		55,364		56,122								71			71
1899	131,147	44	808		57,071		57,879								89			89
1900	149,137	43	913		63,621		64,534								274			274
1901	167,440	41	757	10	69,389		70,156								275			275
1902	181,809	49	531	40	88,767		89,338								287			287
1903	194,879	52	487	75	100,461		101,023								278			278
1904	217,948	54	553	126	117,081		117,760								290			290
1905	215,091	63	634	251	134,717		135,602								373			373
1906	213,263	59	569	502	126,494		127,565								531			531
1907	263,957	63	789	1,005	166,095		167,889	B							751			751
1908	285,287	63	528	3,933	178,527		182,988	12							945	B		957
1909	298,709	61	421	2,714	183,171		186,306	18							1,411	57		1,486
1910	327,763	64	316	3,634	209,557		213,507	20							1,258	143		1,421
1911	344,361	64	291	12,553	220,449		233,293	13							1,465	285		1,763
1912	352,443	63	242	16,558	222,935		239,736	47							1,752	437		2,236
1913	385,345	64	228	25,696	248,446		274,370	131							2,071	504		2,706
1914	407,544	65	215	26,235	265,763		292,213	276							1,837	644		2,757
1915	432,033	65	215	32,911	281,104		314,230	513							2,579	750		3,842
1916	457,500	66	198	40,546	300,767		341,511	867							2,593	929		4,389
1917	502,891	67	214	55,293	335,316		390,823	1,218						57	2,577	1,602	120	5,574
1918	503,515	71	305	63,828	355,928		420,061	1,353						C60	2,527	2,082	333	6,355
1919	555,875	68	241	87,073	378,367		465,681	1,331						C60	2,628	1,841	425	6,285
1920	688,884	64	196	157,069	442,929		600,194	1,651						C60	2,817	2,083	457	7,068
1921	766,002	62	188	193,398	472,183		665,769	2,036					67	C60	3,699	2,354	1,433	9,649
1922	858,898	65	179	182,278	557,531		739,988	2,866					323	C60	5,314	2,445	2,201	13,209
1923	1,015,736	72	170	149,585	732,407		882,162	3,400					425	87	5,699	3,051	4,201	16,863
1924	1,014,318	70	161	139,678	713,940		853,779	4,639					445	C100	8,379	4,057	9,042	26,662
1925	1,068,933	71	332	115,515	763,743		879,590	6,336					1,007	160	9,232	4,387	19,687	40,809
1926	1,096,823	70	364	90,421	770,874		861,659	7,851					6,444	214	10,762	4,971	36,911	67,153
1927	1,262,582	71	477	64,121	901,129		965,727	8,630					15,014	537	10,127	5,380	63,134	102,822
1928	1,324,774	68	624	50,151	901,474		952,249	9,070					19,897	1,084	12,006	7,684	105,749	155,490
1929	1,485,867	68	1,117	44,688	1,007,323		1,053,128	9,391		B			20,385	1,381	13,422	8,716	137,472	190,767
1930	1,410,037	64	1,522	39,530	898,011		939,063	9,002		56			20,346	1,553	12,449	9,419	136,669	189,494
1931	1,372,532	62	1,543	33,039	851,081		885,663	11,709		25			18,237	1,762	10,089	9,744	116,613	168,179
1932	1,309,677	60	1,044	32,805	785,159		819,008	13,139		44			16,414	1,597	9,899	10,126	116,154	167,760
1933	1,442,146	63	1,145	34,001	905,656	23	940,825	13,691		112			13,158	1,620	13,257	9,561	117,720	169,119
1934	1,522,288	60	1,417	38,172	908,065	28	947,682	14,024		159			17,341	1,637	16,314	10,894	136,103	196,472
1935	1,654,495	60	1,447	40,241	996,596	47	1,038,331	14,297		164			17,598	1,732	17,067	11,671	148,254	210,783
1936	1,791,546	61	1,500	41,028	1,099,687	62	1,142,277	15,458		105			18,756	1,942	17,593	13,237	154,794	221,885
1937	2,039,231	63	2,944	46,907	1,279,160	33	1,329,044	16,355		122			20,599	2,161	17,457	15,503	186,230	258,427
1938	1,988,041	61	6,966	38,506	1,214,355	78	1,259,905	17,076		226			21,582	2,246	15,839	17,737	188,174	262,880
1939	2,086,160	60.6	7,838	42,898	1,264,962	112	1,315,810	18,613		215			23,857	2,313	13,508	19,270	206,470	284,246
1940	2,149,821	62.9	8,591	44,036	1,353,214	142	1,405,983	20,609		288	2		25,593	2,349	12,126	22,227	185,570	268,764
1941	2,220,657	63.1	10,134	42,196	1,402,228	150	1,454,708	21,873		235	3		24,553	1,557	11,935	20,506	228,430	309,092
1942	2,093,100	66.2	10,365	34,815	1,386,645	151	1,431,976	23,704	2	308	33		10,487	2,278	13,629	22,069	147,675	220,185
1943	2,256,637	66.7	10,052	35,163	1,505,613	107	1,550,935	27,714	2	334	48		13,261	2,315	14,654	21,385	177,631	257,344
1944	2,592,289	64.7	10,099	38,203	1,677,904	109	1,726,315	24,230	1	314	58		22,291	2,967	14,389	22,139	257,046	343,435
1945	2,594,697	66.0	8,483	43,547	1,713,655	149	1,765,834	22,881	2	382	79		22,449	2,664	13,744	21,093	323,156	406,450
1946	2,745,430	63.2	7,586	49,235	1,733,939	269	1,791,029	20,604	1	363	67		22,118	2,323	12,468	20,233	388,486	466,663
1947	3,022,139	61.4	7,692	56,284	1,856,987	300	1,921,263	21,846	B	377	97		24,794	2,282	12,764	20,521	434,905	517,586
1948	3,433,213	58.8	12,287	58,508	2,020,185	159	2,091,139	23,734	B	464	144		23,792	2,563	14,069	20,111	490,015	574,892
1949	3,404,099	54.1	21,305	60,910	1,841,940	206	1,924,361	22,589		678	109		29,722	2,617	14,790	20,617	482,316	573,438
1950	3,796,658	51.9	29,146	72,443	1,971,845	156	2,073,590	23,353		616	278	629	34,059	2,632	15,077	20,632	546,783	644,059
1951*	4,256,338	52.7	47,834	76,627	2,244,404	118	2,368,983	25,725		529	536	759	38,826	2,628	16,253	20,474	622,293	728,023
Total	69,813,919	61.8	239,415	2,558,981	43,161,763	2,399	45,962,558	483,895	8	6,116	1,454	1,388	543,840	51,658	417,807	433,571	6,173,039	8,112,776

* WORLD OIL from private sources. B Less than 1,000 barrels. C Estimated production.

you have BAKER packers and bridge plugs set on a wire line

by your choice of these service organizations...

BJ SERVICE, INC. • DOWELL INCORPORATED • LANE-WELLS COMPANY • McCULLOUGH TOOL COMPANY • PERFORATING GUNS ATLAS CORP. • SCHLUMBERGER WELL SURVEYING CORP. • WELEX JET SERVICES, INC. WELL PERFORATORS, INC. • THE WESTERN COMPANY

perforating operation and the wire line setting of a Baker Bridge Plug, or a Baker Production Packer can be performed from a *single set-up* by the wire line service organization you select, with definite *savings in time and money.*

Consider also, the advantages of accurate correlated measurements:

(a) wire line measurement while logging the well;

(b) wire line measurement for gun perforating; followed by

(c) wire line measurement for setting Baker Bridge Plugs or Baker Retainer Production Packers.

WHY NOT FIND OUT how you can save wear and tear on tubing (or drill pipe) with *wire line setting?*—Find out also how a Baker Production Packer set on a wire line for dual-zone production, saves almost one-half the cost of drilling two single-zone wells to the same two zones!—Why not get the facts as to how a Baker Bridge Plug provides a positive, leak-proof shut-off against any pressures—how it can be *set on a wire line in a few hours,* and drilled out more readily than any other bridge plug?

Ask Any Baker Representative
—wire, phone or write to any Baker Office for facts and specific recommendations.

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

...and in all active fields throughout the United States.

World Crude Oil Production, By Countries, By Years (Part 2)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources and Minerals Yearbook*, except as otherwise indicated)

	EUROPE														AFRICA			
Year	Albania	Austria	Czecho-slovakia	Great Britain	France	Ger-many	Hun-gary	Italy	Nether-lands	Poland	Rou-mania	[F]U.S.S.R. (Russia)	Yugo-slavia	[F]Total Europe	Egypt	Algeria	Morocco	Total Africa
1857											2			2				
1858											4			4				
1859											4			4				
1860											9			9				
1861								[B]			17			17				
1862								[B]			23			23				
1863								[B]			28	41		69				
1864								[B]			33	65		98				
1865							2				39	67		108				
1866							1				42	83		125				
1867							1				51	120		172				
1868								[B]			56	88		144				
1869								[B]			59	202		261				
1870								[B]			84	204		288				
1871								[B]			90	165		255				
1872								[B]			91	185		276				
1873								[B]			104	475		579				
1874							1			150	103	583		837				
1875							1			158	108	697		964				
1876							3			164	111	1,321		1,599				
1877							3			170	108	1,801		2,082				
1878							4			176	109	2,401		2,690				
1879							3			215	110	2,761		3,089				
1880						9	2			229	115	3,001		3,356				
1881						29	1			287	122	3,601		4,040				
1882						58	2			330	136	4,538		5,064				
1883						27	2			365	139	6,002		6,535				
1884						46	3			408	211	10,805		11,473				
1885						41	2			465	193	13,925		14,626				
1886						74	2			306	168	18,006		18,556				
1887						74	1			344	182	18,368		18,969				
1888						85	1			467	219	23,049		23,821				
1889						68	1			515	298	24,609		25,491				
1890						108	3			659	383	28,691		29,844				
1891						109	8			631	488	34,573		35,809				
1892						101	18			646	593	35,775		37,133				
1893						100	19			693	535	40,457		41,804				
1894						123	21			949	508	36,375		37,976				
1895						121	26			1,453	576	46,140		48,316				
1896						145	18			2,444	543	47,221		50,371				
1897						166	14			2,226	571	54,399		57,376				
1898						184	15			2,376	776	61,610		64,961				
1899						192	16			2,314	1,426	65,955		69,903				
1900						358	12			2,347	1,629	75,780		80,126				
1901						314	16			3,251	1,678	85,168		90,427				
1902						354	19			4,142	2,060	80,540		87,115				
1903						446	18			5,235	2,763	75,591		84,053				
1904						637	26			5,947	3,599	78,537		88,746				
1905						561	44			5,766	4,421	54,960		65,752				
1906						579	54			5,468	6,378	58,897		71,376				
1907						757	60			8,456	8,118	61,851		79,242				
1908						1,009	51			12,612	8,252	62 187		84,111				
1909						1,019	42			14,933	9,327	65,970		91,291				
1910						1,032	51			12,673	9,724	70,337		93,817				
1911						1,017	75			10,519	11,108	66,184		88,903	21			21
1912						1,031	54			8,535	12,976	68,019		90,615	214			214
1913						857	47			7,818	13,555	62,834		85,111	98			98
1914						781	40			6,436	12,827	67,020		87,104	753	1		754
1915						703	44			5,352	12,030	68,548		86,677	212	4		216
1916						656	51			6,587	8,945	65,817		82,056	404	8		412
1917					[G]	642	41			6,228	3,721	63,072		73,704	943	9		952
1918					363	270	35			6,032	8,730	27,168		42,598	1,935	7		1,942
1919			48	2	334	265	35			6,096	6,618	31,752		45,150	1,517	5		1,522
1920			69	3	356	246	35			5,607	7,435	25,430		39,181	1,042	4		1,046
1921			94	3	389	274	32			5,167	8,368	28,968		43,295	1,255	3		1,258
1922			120	1	496	319	31			5,227	9,843	35,692		51,729	1,188	9		1,197
1923			74	1	494	346	34			5,402	10,867	39,147		56,365	1,054	9		1,063
1924			76	2	497	406	39			5,657	13,369	45,355		65,401	1,122	11		1,133
1925			158	3	459	541	61			5,960	16,650	52,448		76,280	1,226	12		1,238
1926			150	2	478	653	41			5,844	23,314	64,311		94,793	1,188	9		1,197
1927			112	2	504	663	47			5,342	26,368	77,018		110,056	1,267	8		1,275
1928			94	1	512	630	46			5,492	30,773	[D]84,745		122,293	1,842	8		1,850
1929			93		535	704	45			4,988	34,758	[D]99,507		140,630	1,868	20		1,888
1930			157	[B]	523	1,182	59			4,904	41,624	[D]125,555		174,004	1,996	16		2,012
1931			134	[E]	520	1,606	124			4,662	49,127	162,842		219,015	2,038	[E]		2,038
1932			126	[E]	530	1,608	208			4,116	53,815	154,367		214,770	1,895	[E]	7	1,902
1933	11		122	[E]	562	1,665	204			4,072	54,020	154,840		215,496	1,663	[E]	7	1,670
1934	10		178	[E]	557	2,187	151			3,913	62,063	174,318		243,377	1,546	[E]	6	1,552
1935	41	44	133	[E]	541	2,996	119			3,812	61,310	182,386	2	251,384	1,301	[E]	4	1,305
1936	273	50	127	[E]	503	3,115	123			3,789	63,659	186,206	1	257,846	1,278	[E]	4	1,282
1937	619	221	123	[E]	502	3,176	16	110		3,716	52,452	193,241	4	254,180	1,196	[E]	22	1,218
1938	752	383	130	[E]	513	3,861	288	101		3,763	48,487	204.956	9	263,243	1,581	[E]	27	1,608
1939	934	1,240	120		500	4,487	1,103	91		3,898	45,648	216,866	10	274,897	4,666	[E]	27	4,693
1940	1,497	2,808	163	124	496	7,371	1,581	85		3,891	43,168	218,600	10	280,094	6,505	[E]	27	6,532
1941	1,334	4,238	182	223	414	6,303	3,183	95		1,793	40,517	238,150	10	296,443	8,546	[E]	27	8,573
1942	1,601	5,899	271	605	463	5,191	5,037	101		2,794	42,094	227,470	10	291,536	8,275	[E]	41	8,316
1943	1,001	7,478	200	839	356	4,973	6,347	86	1	3,500	39,182	200,750	10	264,723	8,953		39	8,992
1944	344	8,218	185	703	300	6,154	6,277	55	12	3,000	26,191	275,000	220	326,649	9,416	4	32	9,452
1945	267	3,074	91	532	202	3,935	5,018	53	41	750	34,772	148,953	200	197,888	9,406	2	26	9,434
1946	1,000	5,734	196	412	368	4,539	5,146	83	435	866	31,434	157,673	160	208,046	9,070	1	20	9,091
1947	2,000	6,285	210	351	356	4,032	4,330	81	1,478	951	28,552	187,463	290	236,379	8,627	1	21	8,649
1948	1,500	6,149	204	323	370	4,489	3,647	71	3,443	1,039	34,000	218,000	270	273,505	13,398	1	100	13,499
1949	2,188	6,100	292	338	411	5,947	3,791	71	4,314	1,205	33,700	237,700	470	296,527	15,997	2	136	16,135
1950	2,335	6,150	292	340	909	7,904	4,198	63	4,897	1,205	32,000	266,200	780	327,273	16,373	24	305	16,702
1951*	2,078	13,454	270	327	2,009	9,389	3,012	102	5,039	890	30,864	274,480	543	342,457	16,417	4	569	16,990
Total	19,775	77,525	4,995	5,137	17,322	116,040	53,274	3,656	19,660	280,788	1,288,450	6,837,228	8,999	8,726,849	169,292	182	1,447	170,921

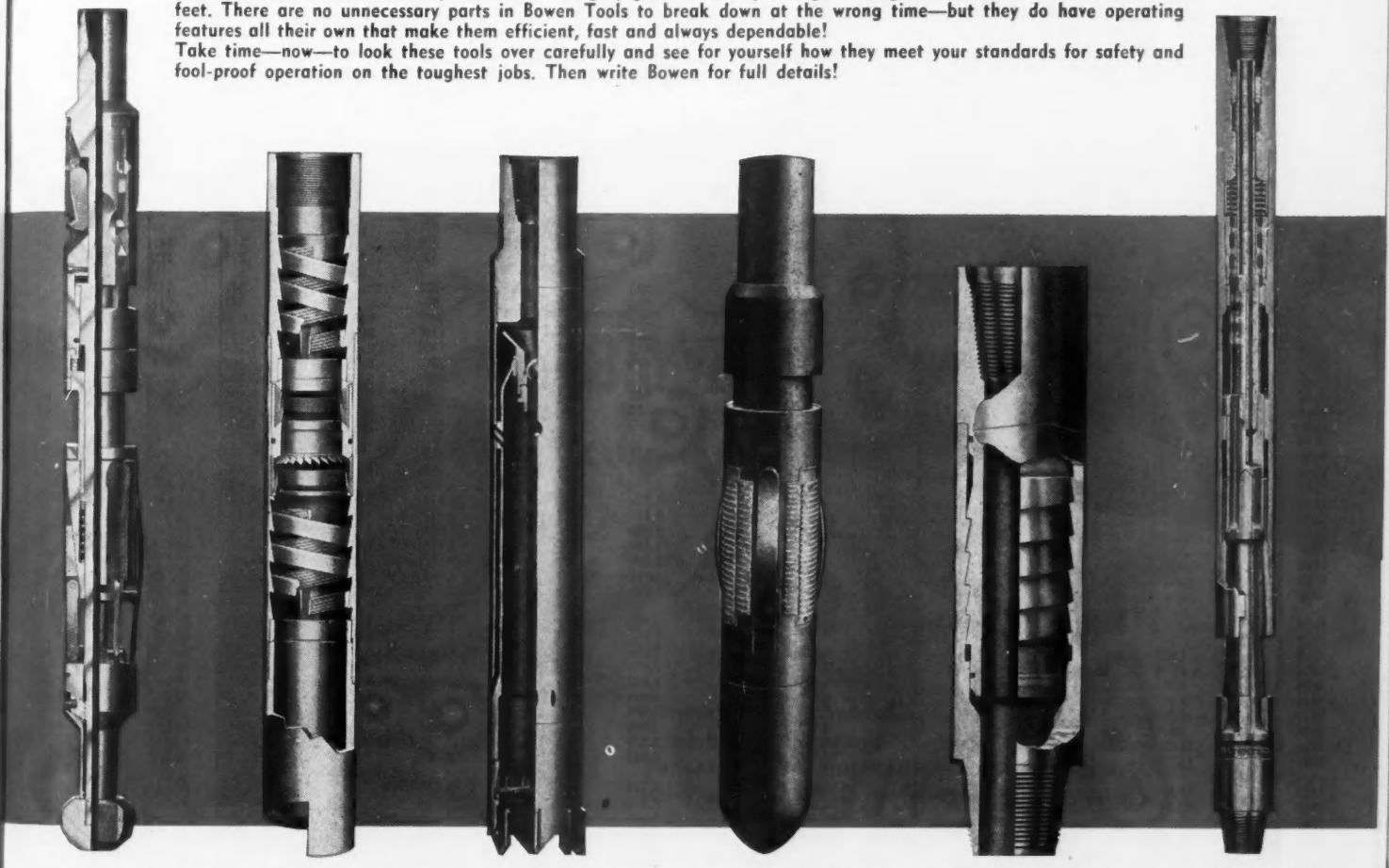
* **WORLD OIL** from private sources fields in Russian Asia other than Sakhalin.

[B] Less than 1,000 barrels. [C] Estimated production. [D] Year ended September 30. [E] No more data available. [F] Includes [G] France's earlier production credited to Germany.

A COMPLETE *First Aid* PROGRAM
For Overseas Drilling!

Here's a line-up of Bowen Fishing Tools that are essential for overseas drilling operations. With these tools on your rig, you'll lick practically any fishing job that comes along . . . whether it's small junk lost in the hole . . . a twistoff . . . a stuck string of pipe or casing . . . or any other job that calls for fast work and the right tools!

And notice one thing about all these Bowen Tools—their simple, rugged construction. When you're far away from machine shops or other ordinary facilities it's mighty good to know you've got fishing tools that will stand on their own feet. There are no unnecessary parts in Bowen Tools to break down at the wrong time—but they do have operating features all their own that make them efficient, fast and always dependable!
Take time—now—to look these tools over carefully and see for yourself how they meet your standards for safety and fool-proof operation on the toughest jobs. Then write Bowen for full details!



BOWEN CASING CUTTER

A precision tool for cutting casing, drill pipe and tubing. Ideal for "cut and pull" jobs. Simple to operate and won't slip down pipe after cutting begins. Withstands operating stresses at all depths. Can be set and released as often as desired without coming out of the hole.

BOWEN RELEASING OVERSHOT

Catches drill pipe, coupling or tool joint without changing slips or making adjustments. Spiral gripping member cinches tighter as load increases, yet releases with only a downward bump and a turn to the right. Built-in milling member trims ragged edges, insuring perfect gripping and packing off.

BOWEN JUNK BASKET

Made to retrieve every popular type bit cone as well as all small pieces of junk. Inner passages provide reverse circulation that enables full pump pressure to be used and permits circulating out of hole without losing fish. Also widely used for core recovery and hole straightening.

BOWEN RELEASING SPEAR

Just six simple parts enable this tool to stand hardest use. Used for jarring, "cutting and pulling," left-handing, and holding casing while last joint is cut for landing. Holds with a positive grip, yet release can be effected whenever desired.

BOWEN SAFETY JOINT

This Safety Joint is designed for all drilling and fishing operations. Has only two simple parts—a pin and box section, equipped with high pressure packers to prevent leakage. Safely stands greater pulling or twisting strains than the string, and releases only at the will of the operator. Will deliver full torque capacity of string in either direction.

SPECIAL BOWEN ROTARY JAR

The choice of operators everywhere for all jarring. No torque required for delivering the blow — just a straight pull. As many as ten blows per minute have been struck. It incorporates means for varying pull required to trip it without coming out of hole.

SR BOWEN CO

MAIN OFFICE AND PLANT:
11008 SOUTH NORWALK BOULEVARD
SANTA FE SPRINGS, CALIFORNIA

EXPORT OFFICE:
30 ROCKEFELLER PLAZA
NEW YORK CITY, NEW YORK

EXPORT REPRESENTATIVE: VAL. R. WITTICH, JR.

World Crude Oil Production, By Countries, By Years (Part 3)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources and Minerals Yearbook*, except as otherwise indicated)

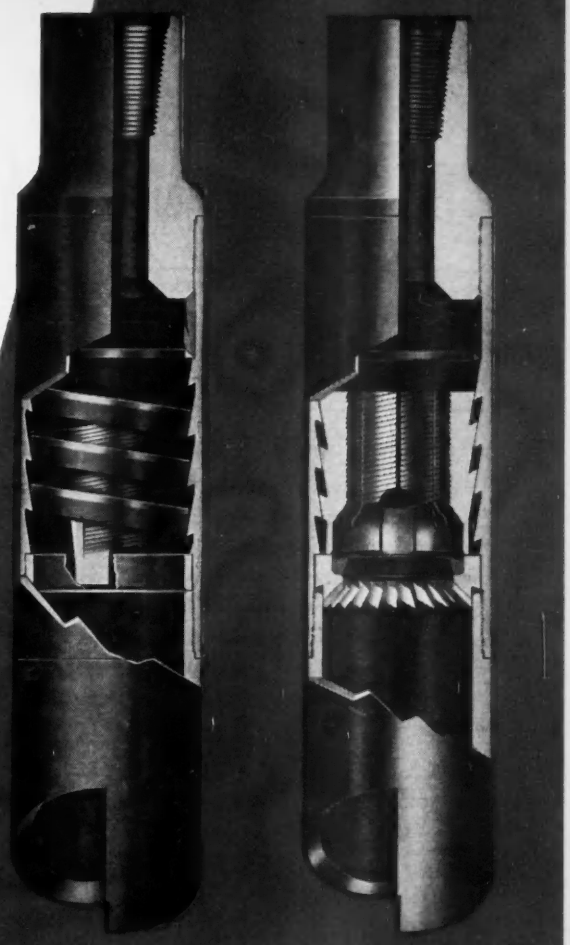
	ASIA — Middle East								ASIA — Far East													
										[E]Burma-India Pakistan												
Year	Bahrein	Iran	Iraq	Kuwait	Qatar	Saudi Arabia	Turkey	Total Middle East	British Borneo	Burma	Pakistan	India	China	[H] Formosa	Japan	Indonesia	Sakhalin	Total Far East	[F]Total Asia	Australia-N.Z.	Rest of World
1857																					
1858																					
1859																					
1860																					
1861																					
1862																					
1863																					
1864																					
1865																					
1866																					
1867																					
1868																					
1869																					
1870																					
1871																					
1872																					
1873																					
1874																					
1875															5			5	5		
1876															7			7	7		
1877															10			10	10		
1878															18			18	18		
1879															23			23	23		
1880															26			26	26		
1881															17			17	17		
1882															15			15	15		
1883															20			20	20		
1884															28			28	28		
1885															30			30	30		
1886															38			38	38		
1887															29			29	29		
1888															37			37	37		
1889											94				53			147	147		
1890											118				52			170	170		
1891											190				53			243	243		
1892											242				69			311	311		
1893											299				106	600		1,005	1,005		
1894											327				173	688		1,188	1,188		
1895											372				170	1,216		1,758	1,758		
1896											430				237	1,427		2,094	2,094		
1897											546				262	2,552		3,360	3,360		
1898											542				319	2,964		3,825	3,825		
1899											941				539	1,796		3,276	3,276		
1900											1,079				871	2,253		4,203	4,203		
1901											1,431				1,117	4,014		6,562	6,562		20
1902											1,617				996	2,430		5,043	5,043		26
1903											2,510				1,209	5,770		9,489	9,489		36
1904											3,385				1,219	6,508		11,112	11,112		40
1905											4,137				1,347	7,850		13,334	13,334		30
1906											4,016				1,564	8,181		13,761	13,761		30
1907											4,344				1,718	9,983		16,045	16,045		30
1908											5,047				1,871	10,283		17,201	17,201		30
1909											6,677				1,887	11,042		19,606	19,606		20
1910											6,138				1,829	11,031		18,998	18,998		20
1911											6,451				1,737	12,173		20,361	20,361		20
1912											7,117				1,659	10,846		19,622	19,622		20
1913		1,857						1,857	141		7,930				1,940	11,172		21,183	23,040		20
1914		2,910						2,910	318		7,410				2,636	11,422		21,786	24,696		20
1915		3,616						3,616	392		8,202				2,928	11,920		23,442	27,058		10
1916		4,477						4,477	629		8,491				2,963	12,547		24,630	29,107		25
1917		7,147						7,147	542		8,079				2,861	13,180		24,662	31,809		29
1918		8,623						8,623	504		8,188				2,441	12,778		23,911	32,534		25
1919		10,139						10,139	596		8,736				2,238	15,508		27,078	37,217		20
1920		12,230						12,230	1,020		8,375				2,221	17,529		29,145	41,375		20
1921		16,673						16,673	1,411		8,734				2,233	16,958	2	29,338	46,011		20
1922		22,247						22,247	2,849		8,529				2,055	17,066	7	30,506	52,753		22
1923		25,230						25,230	3,940		8,406				1,804	19,870	9	34,029	59,259		24
1924		32,373						32,373	4,163		8,416				1,814	20,473	80	34,946	67,319		24
1925		35,038						35,038	4,257		8,274				1,915	21,422	87	35,955	70,993		23
1926		35,842						35,842	4,942		8,011				1,785	21,243	181	36,162	72,004		17
1927		39,688	338					40,026	4,943		8,032				1,789	27,459	440	42,663	82,689		13
1928		43,461	713					44,174	[G]5,223		8,741				1,944	32,118	677	48,703	92,877		15
1929		42,145	798					42,943	5,290		8,747				2,023	39,279	[D]1,134	56,473	99,416		38
1930		45,828	913					46,741	4,907		8,292				1,950	41,729	[D]1,805	58,683	105,424		40
1931		44,376	830					45,206	3,854		8,200				2,050	35,539	2,734	52,377	97,583		54
1932		49,471	836					50,307	3,796		8,817				1,630	39,001	2,631	55,875	106,182		62
1933	31	54,392	917					55,340	4,490		8,743				1,455	42,606	2,338	59,632	114,972		71
1934	285	57,851	7,689					65,825	5,140		10,503				1,834	46,925	2,881	67,283	133,108		96
1935	1,265	57,273	27,408					85,946	5,546	7,181	[E]	2,038			2,249	47,171	2,545	66,730	152,676	5	4
1936	4,645	62,718	30,406			20		97,789	5,209	7,588	[E]	1,978			2,440	50,025	3,212	70,452	168,241	5	4
1937	7,762	77,804	31,836			65		117,467	6,009	7,848	[E]	2,162			2,488	56,724	3,656	78,887	196,354	4	4
1938	8,298	78,372	32,643			495		119,808	6,913	7,538	[E]	2,488			2,511	57,318	[C]3,821	80,589	200,397	4	4
1939	7,589	78,151	30,791			3,934		120,465	7,097	7,873	[E]	2,327	4		2,654	62,087	4,000	86,042	206,507	3	4
1940	7,074	66,317	24,225			5,075		102,691	7,047	7,731	[E]	2,302	10		2,639	62,011	4,000	85,740	188,431	3	14
1941	6,794	50,777	12,650			4,310		74,531	6,864	7,762	[E]	2,899	87	62	1,929	53,704	4,000	77,307	151,838	3	
1942	6,241	72,256	19,726			4,530		102,753	3,000	2,500	[E]	2,792	340	48	1,652	24,000	4,000	38,332	141,085	2	
1943	6,572	74,612	24,848			4,868		110,900	4,500	1,000	[E]	2,735	447	38	1,727	48,294	5,000	63,741	174,641	2	
1944	6,714	102,045	30,943			7,794		147,496	6,000	750	[E]	2,784	505	40	1,601	22,260	5,000	38,940	186,436	2	
1945	7,309	130,526	35,112			21,311		194,258	2,100	725	[E]	2,363	484	14	1,544	7,600	6,000	20,830	215,088	3	
1946	8,010	146,819	35,665	5,931		59,944		256,369	2,050	15	[E]	2,193	513	16	1,343	2,100	6,000	14,230	270,599	2	
1947	9,411	154,998	35,834	16,225		89,852		306,320	12,970	59	356	1,863	374	22	1,276	8,020	[C]7,000	31,940	338,260	2	
1948	10,915	190,384	26,115	46,500		142,853		416,767	20,124	341	490	1,875	533	23	1,122	31,900	7,000	63,408	480,175	3	
1949	10,985	204,712	30,957	90,000	750	174,008	95	511,507	25,108	248	824	1,906	730	22	1,353	44,932	7,000	82,123	593,630	8	
1950	11,016	242,475	49,919	125,722	12,268	199,547	54	641,001	30,958	450	800	1,867	730	23	2,048	50,148	7,000	94,024	735,025	9	
1951*	11,008	123,633	60,951	203,824	17,719	276,313	103	693,551	37,430	754	1,505	1,900	728	24	2,502	54,953	6,531	106,327	799,878	7	
Total	131,924	2,509,486	553,063	488,202	30,737	994,919	252	4,708,583	252,372		346,716		5,485	332	100,947	1,324,598	100,771	2,131,121	6,839,704	67	1,044

* **WORLD OIL** from private sources. [B] Less than 1,000 barrels. [C] Estimated production. [D] Year ended September 30 [E] Separation of British India and Burma prior to 1935 not available from U.S. Bureau of Mines data used here. Data by Dudley Stamp in "Petroleum Development and Technology, 1933," and in A.I.M.E. "Transactions" indicate cumulative through 1934 as follows: Burma 184,528, India 20,756. Pakistan included with India prior to 1947. [F] Exclusive of U.S.S.R. fields in Asia, other than Sakhalin, which are included with U.S.S.R. in Europe. [G] Beginning of production in Brunei. [H] Formosa included with Japan prior to 1941.

ESSENTIAL OIL FIELD SPECIALTIES FOR DRILLING FISHING-PRODUCING

In use throughout the world, proved in the field over the years, Bowen Company of Texas tools are a byword for dependability in the Oil Industry.

The two single bowl Overshots pictured are two of the most popular we make. Our catalog lists well over 100 models. This wide selection makes it possible to select a unit for specific requirements.



Series 150
BOWEN OVERSHOT

Single Bowl
ITCO OVERSHOT

BOWEN CO. OF TEXAS

BOWEN-ITCO RELEASING SPEARS

These tools are available in both standard and heavy duty models. While the standard model is really heavy duty in comparison with conventional design, some operators prefer an extra heavy model which is furnished as Bowen's Heavy Duty Model.

FEATURES: Important advantages include its unusual strength; definite assurance of positive engagement with the fish; definite assurance it can be released when desired and then absolute confidence that the fish can be re-engaged after release.

The grapple in the tool is unusually long; it presents a solidly supported gripping area. **The grapple on the standard 2½" Tubing Spear places nearly 50 sq. in. of supported wickered area in contact with the fish.** This permits hard jarring and extremely heavy pulling strains without distorting the fish.

THE HEAVY DUTY MODEL with longer body and grapple presents twice as much supported wickered area in contact with the fish. Heavy duty models are available in all sizes, but only 3" and 3½" are carried in stock. Complete information — catalogs and operating instructions are available on request.

BOWEN CO. OF TEXAS, INC. HOUSTON 1, TEXAS

P. O. BOX 1025 FACTORY AND OFFICE: 2429 CROCKETT ST. PHONE ATwood 4568

BRANCH WAREHOUSES

Odessa, Texas, 213 North Dixie Blvd., Phone 6-3403; Oklahoma City, Okla., 2810 South High St., Phone 6-8087; Corpus Christi, Texas, 1703 North Port Street, Phone 3-3141; New Iberia, Louisiana, Highway 90, Phone 2096-R; Houma, Louisiana, Magnolia at Barrow St., Phone 6709; Casper, Wyoming, 630 W. Yellowstone, Phone 3108; Farmington, New Mexico, P. O. Box 1073, Phone 757-W.

World Tanker Fleet

Barely Meets Demand

THE PRESENT tight tankship market can be expected to continue for the next two years and may extend through 1957. Meanwhile, tanker charter rates will continue high. U. S. shipyards lag far behind those of other major nations in building tankships, building or having on order less than a tenth of worldwide business. Great Britain has almost half. Sweden and Netherlands also lead the U. S., and Western Germany is building as much as U. S. Higher construction and operating costs discourage building U. S. tankers. Unless incentive is given to U. S. tanker operators, no large expansion of U. S. construction is likely.

By BENEDICT SAURINO

Manager, Statistical Research Division
Sun Oil Company, Philadelphia

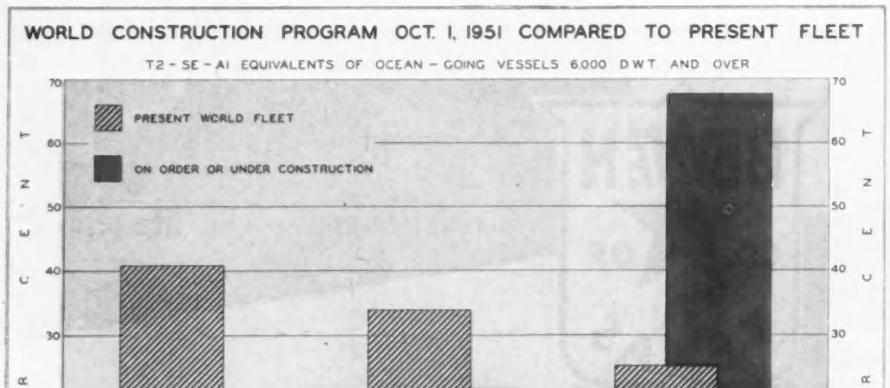


FIGURE 1

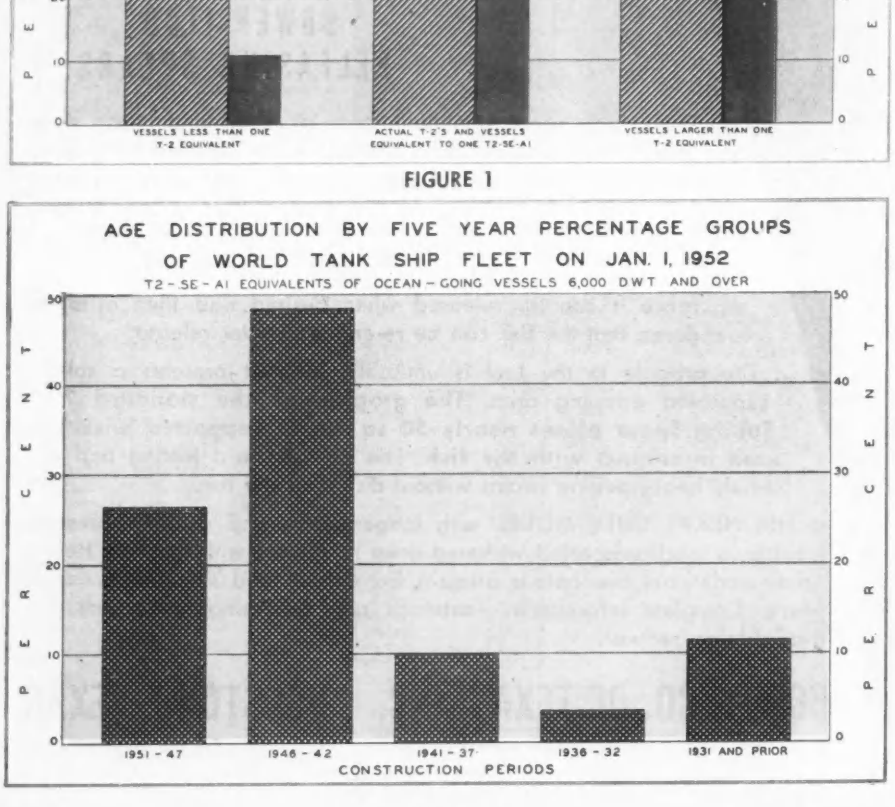


FIGURE 2

UNDER the multiple impact of worldwide defense preparations, the Abadan refinery shutdown, and the sharp increase in world demand for petroleum and its products, there was in 1951 a close balance between availability and requirements for commercial petroleum tankers. While greater abnormalities in world petroleum flow may have affected the 1951 tank ship balance, actual petroleum movements have been established by origin and destination ports for the more normal year of 1950.

Based on this world flow of crude oil and products (Tables 2 and 3), commercial petroleum trade alone in 1950 required the services of 1208 T-2 equivalent tankers. When considering tank ships of 6000 deadweight tons and over, there were available in 1950 an average of 1199 T-2's for ocean-going petroleum transportation.

Factors which resulted in this close balance can be summarized as follows:

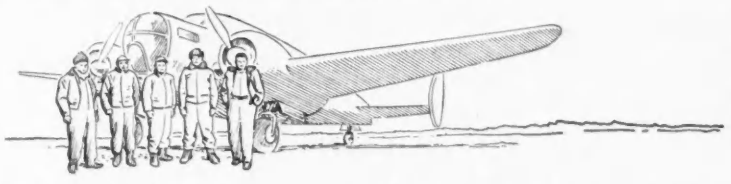
- Tanker tonnage required for commercial petroleum trade in 1950 was slightly higher in the Eastern than in the Western Hemisphere, both on the basis of cargo origin and by destination.

- Because of longer hauls, as well as volume carried, cargoes originating in the Persian Gulf area required 47 percent of the 1208 T-2's engaged in petroleum trade during 1950, or an amount slightly greater than the tonnage used in the entire Western Hemisphere movement.

- Gross tanker movements for coastal, intercoastal, export and import trade of the U. S. accounted for

THE "WHY" OF LEADERSHIP...

Combatting . . . high winds, snow, glaciers, treacherous air currents in Alaska canyons . . . mud and shrub in Canadian muskeg country . . . malaria and sleeping sickness in the deadly tsetse-ridden jungles of Portuguese East Africa . . . dangerous assignments in the Middle East—all of these are common experiences to our men in their mapping and exploration assignments throughout the world. Their jobs call for individual initiative, an ability to think fast, to improvise, to complete their assignments quickly and accurately.



LEADERSHIP is a precious quality. It is dynamic, alive, challenging. Leadership of a nation—or of a company — is determined by the men who compose it. A leader in its own field, Aero Service *pioneered* aerial photography and mapping. It was *first* to use the airborne magnetometer for exploration on a commercial basis . . . and it remains *first* with the help of such men as are pictured here. To these men and to our 300 other employees, we proudly dedicate this advertisement.

***For your mapping requirements, consult a leader . . . consult* AERO!**

TOPOGRAPHIC MAPS • PLANIMETRIC MAPS

PRECISE AERIAL MOSAICS • AIRBORNE MAGNETOMETER SURVEYS

RELIEF MODELS • COLOR PHOTOGRAPHY

In Canada, our affiliate is CANADIAN AERO SERVICE, LTD., 348 Queen Street, Ottawa, Ontario

AERO

SERVICE CORPORATION

PHILADELPHIA 20, PENNSYLVANIA

Oldest Flying Corporation in the World

448 T-2's or 37 percent of world petroleum trade in 1950.

- World tanker tonnage requirements were about evenly divided between crude oil and petroleum product cargoes, but wide differences occurred between individual supply areas.
- Seasonal peak requirements from November to April reach a high of 11 percent in January above average monthly tanker needs for the year in the U. S. trade north of Hatteras.
- Peak seasonal tanker needs in January, 1950, were 56 T-2's above the average monthly requirements for the year and represented the equivalent of 15 million barrels of onshore storage.

In a recent study prepared for Petroleum Administration for Defense, it was necessary to develop a statistical forecasting method for estimating world tank ship requirements several years forward. A high relationship was found to exist between the world production of crude oil and the tanker fleet during the half century 1900-1950. About 98 or 99 percent of the changes in the world tanker fleet were directly related to changes in crude oil production. Admittedly, this high degree of correlation could be reduced in the future by sudden shifts in supply and/or consumption areas, and also by large pipe line completions within any short time span in such areas as the Middle East or U. S. Gulf to East Coast.

Accepting these limitations, the outlook for the next several years when based on the correlation formula would be in the order of magnitude shown in Table 1.

An acceptance of the basic assumptions contained in the above computation would conclude that the present tight tanker market will continue for the next two years. Additionally, a close statistical balance will exist from 1954 through 1957.

As in any prognosis, a number of important conditions and problems are contained in these conclusions.

TABLE 1

YEAR	Estimated World Crude Oil Production (Barrels Daily)	T-2 Equiv. Computed World Tank Ships Required	T-2 Equiv. Est. Avge. Tank Ships Available (No Scrappage)	T-2 Equiv. Long (+) or Short (—)
1952	11,295,000	1,694	1,652	—42
1953	11,791,000	1,771	1,770	— 1
1954	12,310,000	1,853	1,872	+19
1955	12,851,000	1,937	1,967	+30
1956	13,415,000	2,026	2,062	+36
1957	14,005,000	2,118	2,157	+39

TABLE 2

T-2 Tanker Flows of Crude Oil and Petroleum Products Into Major Areas by Origin, 1950

Origin and Destination	Tankers To Move Crude	Tankers To Move Products	Total T-2 Tankers
East Coast—U. S. From			
California	...	23	23
Gulf Coast, U. S.	54	123	177
Caribbean	41	40	81
Mexico	5	3	8
Persian Gulf	84	..	84
Near East	1	..	1
Total	185	189	374
Europe, N. Africa, N. East, P. Gulf From:			
United States (1)	1	13	14
Mexico	4	2	6
Caribbean (2)	31	76	107
Near East	26	...	26
Persian Gulf (3)	235	107	342
Other Latin America	1	..	1
Europe (4)	..	7	7
Oceania	..	3	3
Total	298	208	506
Oceania (Ex. Hawaii) From:			
United States	..	1	1
Caribbean & Europe	..	1	1
Persian Gulf	1	33	34
Oceania	2	6	8
Total	3	41	44
South & East Asia From:			
United States	3	4	7
Persian Gulf	7	37	44
Oceania	1	13	14
Total	11	54	65
West Coast—U.S., W. Canada, Alaska, Hawaii From:			
West Coast to West Coast, U. S.	7	20	27
West Coast to Canada	3	6	9
West Coast to Alaska	..	*	*
West Coast to Hawaii	..	4	4
Total	10	30	40
Other Latin America & Caribbean From:			
United States	1	8	9
Caribbean (5)	10	49	59
Other Latin America	2	2	4
Persian Gulf	22	2	24
Oceania	3	..	3
Total	38	61	99
Canada (Eastern) From:			
Caribbean	19	4	23
Near East	1	..	1
Persian Gulf	25	..	25
Total	45	4	49
South & East Africa From:			
United States	..	1	1
Persian Gulf	..	18	18
Total	..	19	19
West Africa From:			
Caribbean	..	7	7
Total	..	7	7
Total World Tanker Flow Above	590	613	1,203
Balance	..	..	5
Total World Tanker Flow 1950 In T-2 Equivalents	..	..	1,208

	Crude	Products
(1) Incl. U. S. to P. G.	..	1
(2) Incl. Carib. to N. Africa	1	4
(3) Incl. P. G. to N. Africa	3	6
Incl. P. G. to N. East	1	21
(4) Incl. Europe to Europe	5	..
Incl. Europe to N. Africa	..	1
Incl. Europe to N. East	..	1
(5) Incl. Carib. to Carib.	..	5

* Less than 0.5.

The most prominent factors would relate to:

- The general economic framework.
- The magnitude of the present tanker construction program.
- The probable ship completion and delivery rate.
- The obsolescence rate.

Generally, a continuation of the present economic conditions has been accepted in this analysis. This would include a volume of military petroleum requirements for some type of peripheral war activity and an increase of 4 to 5 percent per year in the world production of crude. In addition, the same relative rates of change both in pipe line construction and tanker operating productivity as those of the past half century are implicit in the correlation formula.

On September 1, 1951, there were on order and under construction 561 tank vessels of about 10,700,000 dwt and having an average speed of 14.6 knots, or approximately the same as the rated T-2 speed (Table 4). Because of larger average size, these 561 tankers were approximately equivalent to 657 T-2's in carrying capacity. About 32 T-2's will probably be delivered in the last third of 1951, leaving 625 T-2's of this program for future construction on January 1, 1952. These vessels represent nearly 40 percent of the world tank ship fleet estimated for the beginning of 1952.

Less than 7 percent of the present tanker construction program has been placed in U. S. shipyards, while 47

TABLE 3

Relative Utilization of World Tank Ship Fleet for Commercial Petroleum Trade in 1950

(By Point of Origin and Also by Destination)

AREA	By Point Of Origin	By Point Of Destination
United States	22.8%	33.2%
Caribbean	22.9	0.7
South America	0.4	7.5
Other Western Hemisphere	1.1	4.9
Total Western Hemisphere	47.2	46.3
Europe	0.6	38.3
Near East	2.3	2.1
Persian Gulf	47.4	0.1
Oceania	2.5	3.9
Other Eastern Hemisphere	0.0	9.3
Total Eastern Hemisphere	52.8	53.7
Total World	100.0	100.0

Gross U. S. Movement	T-2's	Percent of World
U. S. to—U. S.	227.8	18.8%
—Others	46.9	4.0
U. S. from Others	173.3	14.3
Total U. S. Flow	448.0	37.2

the tong that made Web Wilson famous

"Web Wilson" and "Wilson Type" Tongs have been famous for efficiency and economy since the early days of rotary drilling. Most major improvements in tong design and dependability may be credited to Web Wilson Oil Tools, Inc.

CHECK THESE ADVANTAGES * Spiral hinge pin arrangement * Longer tong life * Greater gripping power * Fewer parts * Self locking latch with finger guard * Size range changed by replacing one jaw only * Fully adjustable, simple one-piece hanger * Safety rope attachment * Maximum strength, minimum weight.

WEB WILSON Oil Tools INC.

LOS ANGELES, CALIFORNIA • HOUSTON, TEXAS • NEW YORK, N. Y.

FIELD PROVEN

percent is being built in Great Britain and 16 percent in Sweden. The present U. S. tanker construction program proportion is exceeded by The Netherlands' orders, 8.9 percent, and equaled by the 6.9 percent of the total program orders placed in Western Germany's shipyards. Primarily responsible for this situation are the two factors of construction cost and operating cost differentials between U. S. tankers and those of foreign build and registry. Unless some incentive is made available to U. S. tanker operators, there appears small likelihood that a large expansion in construction will occur in this country.

A comparison of vessel size and speed between current construction and present fleet is afforded in Figure 1 and Table 5.

Only 11 percent of the present construction program reflects tank ships which are smaller than a T-2 in carrying capacity while 22 percent are equal to a T-2 and the remaining 67 percent have greater performance capacity than a T-2.

Numerous interviews both with U. S. and British tanker owners having large construction orders in foreign yards developed the fact that delivery dates submitted by builders may be too optimistic. Instead, substantial agreement among those interviewed indicated that all shipyards outside those in the U. S. would probably deliver only 95 T-2 equivalent tank ships annually for the next few years. Estimates ranged from 86 T-2's to 104 T-2's. It is on the basis of this consensus and the magnitude of orders for dry cargo shipping that foreign deliveries of tankers have been maximized at 95 T-2 equivalents per year. Probable levels of completions for the present program are shown in Table 6.

With the anticipation of greater steel supply available for shipbuilding in the third quarter of 1952, it appears that the present tanker program in U. S. yards will be completed by the end of 1953. For the lack of steel in the first half of 1952, it is also probable that total deliveries in the entire year may be less than the estimated 126.5 T-2 equivalent tank ships.

Perhaps the final major problem, obsolescence, will present the industry with its greatest difficulties (Figure 2). The age of the present fleet is distributed as shown in Table 7.

Obviously, the tanker industry is presently confronted with the knowledge that 183 T-2 equivalents and 11.5 percent of the world fleet are over 20 years of age. Within the next five years, 1952 through 1956, another 58 T-2 equivalent tankers will fall in this category for a total of 241 T-2's and 15 percent of the present fleet. From 1957 through 1961 another 10 percent of the present fleet will become over-age. It is at that time, 1962, that the war built tankers will begin to enter the 20-year age group. In the following quinquennium, 1962 through 1966, about 770 T-2 equivalents or nearly half, 48.5 percent, of our present fleet will reach the "20 years and over" status. Thus, the tanker industry must consider either the extensive repair or complete replacement of about one-quarter of the present fleet in the next decade and three-quarters of the current world fleet in the next 15 years.

This problem of obsolescence will become more intensified as the present construction program nears completion. Unit operating costs for wages, food and fuel in a large, fast, modern tanker for long hauls are considerably below comparable costs for the older vessels. The compensating fixed costs of depreciation on lower construction outlay and insurance based on resale value for the older tankers may offset, in part, these technological advances in ship design. Eventually, however, operators must face the dilemma of making either large outlays on old tank vessels to put them in class or even larger expenditures for new and more modern construction.

The basic evidence presented in this analysis is that a tight tanker supply-demand balance will exist for the next two to six years. Unless a substantial expansion occurs in new construction or an extremely large effort is made in a program of extensive repairs for the older fleet before 1961, the tanker industry will then be faced with the severe impact of having to replace nearly three-quarters of its fleet in the five years 1962-1966.

After weighing the findings and probabilities of this analysis, they appear to indicate that a high level of tanker charter rates will continue for the next two years.

ACKNOWLEDGMENT

Grateful acknowledgment is made for the indispensable cooperation furnished by Esso Shipping Company, Shell Petroleum Company, Ltd., and Overseas Tankship Corporation. This article could not have been prepared without the primary essential data supplied by the Foreign and Program Divisions of PAD and the Vessel Records Section of the Maritime Administration. Finally, the basic statistical compilations were assembled under the direction of J. Hunter McDowell of Sun Oil Company's Statistical Research staff.

TABLE 4

Tankships on Order or Under Construction in World, by Country of Construction, September 1, 1951

(Ocean-Going Vessels 6,000 Deadweight Tons and Over)

COUNTRY of CONSTRUCTION	No.	Deadweight Tonnage	T2-SE-A1 Equivalents	Percent of World	Average Speed
United States	26	659,650	45.5	6.9	16.5k
Belgium	6	88,720	5.4	0.8	14.6
Canada	2	31,600	1.8	0.3	14.0
Denmark	14	236,300	14.1	2.1	14.3
France	16	160,500	9.7	1.5	14.3
Germany	40	733,300	45.6	6.9	14.9
Italy	10	210,000	14.3	2.2	16.3
Japan	11	291,500	18.9	2.9	15.5
Netherlands	49	962,100	58.7	8.9	14.6
Norway	33	476,500	28.0	4.3	14.1
Portugal	0	0	0.0	0.0	12.0
Spain	5	36,700	1.9	0.3	12.7
Sweden	91	1,759,300	105.8	16.1	14.4
United Kingdom	258	5,033,640	306.9	46.8	14.6
TOTAL	561	10,679,810	656.6	100.0%	14.6k

TABLE 5

	Present Fleet		Sept. 1, 1951 Construction Program	
T-2 Capacity	T-2's	Percent	T-2's	Percent
Smaller than	649	41.0	71	11.0
Equivalent	538	34.0	142	22.0
Larger than	402	25.0	444	67.0
	1,589	100.0	657	100.0

TABLE 6

	U. S. Yards	All Foreign	Total	Cumul.
Sept.—Dec., 1951	0.0	31.7	31.7	31.7
Year 1952	31.5	95.0	126.5	158.2
1953	14.0	95.0	109.0	267.2
1954	0.0	95.0	95.0	362.2
1955	0.0	95.0	95.0	457.2
1956	0.0	95.0	95.0	552.2
1957	0.0	95.0	95.0	647.2
1958	0.0	9.4	9.4	656.6
Total Program	45.5	611.1	656.6	....

TABLE 7

Construction Period	T-2's	Percent	Cumulative T-2's	Cumulative Percent	Over-Age Period (20 Yrs.)
1931 & Earlier	183.3	11.5	183.3	11.5	Present
1932-1936	58.1	3.6	241.4	15.1	1952-'56
1937-1941	158.3	10.0	399.7	25.1	1957-'61
1942-1946	770.5	48.5	1,170.2	73.6	1962-'66
1947-1951	418.9	26.4	1,589.1	100.0	1967-'71
Total	1,589.1	100.0	.....	....	.....

in trout streams

fishing experts use the best rods and reels

FISHING TOOL OPERATING and RENTAL COMPANIES OFFERING LEBUS KNUCKLE JOINT SERVICE

S. R. BOWEN COMPANY
Santa Fe Springs, California and Casper, Wyoming

BROWN OIL TOOLS, INC.
Odessa, Texas

M & B FISHING TOOL CO.
Odessa, Texas

E. E. McCOY & SON
Salem and Grayville, Illinois

BROWN OIL TOOLS, INC.
2216 Campbell Street
Houston, Texas

FRENCH, JORDAN and WHITE
Fishing Tool Service
Harvey, Louisiana

WILSON SUPPLY COMPANY
Fishing Tool Division
Houston, Texas

ACME OIL TOOL COMPANY
1001 S.E. 29th Street
Oklahoma City, Oklahoma

TRI-STATE OIL TOOLS, INC.
2136 East Texas Street
Shreveport, Louisiana

PHIL CORNELL
P. O. Box 2747
Odessa, Texas

LEBUS ROTARY TOOL WORKS, INC.
Odessa and Longview, Texas

Contact Your FISHING TOOL COMPANY FOR INFORMATION

LEBUS

in oil fields

fishing tool experts use LeBus

Knuckle Joint Overshot System...

THE BEST INVESTMENT YOU CAN MAKE . . . because the LeBus Knuckle Joint Overshot System is so efficient that by running the Knuckle Joint above the Overshot on every fishing job, you are able to contact the fish *quickly* and at a *minimum of expense.* The FO-47 Knuckle Joint will help the Overshot Guide contact the fish quickly on the first run, which is insurance against expensive cutting jobs. The cost of cutting a string of stuck pipe is often more expensive than the entire cost of one LeBus FO-47 Knuckle Joint. Have the LeBus Knuckle Joint always available on your derrick floor, and your regular driller becomes an expert fishing tool operator.

LEBUS ROTARY TOOL WORKS

P. O. Box 2352 **LONGVIEW, TEXAS** Phone 1232

PAD's Foreign Program

Encourages Increased U. S. Imports

AREAS outside the U. S. will be encouraged to furnish an increasing proportion of the the Western world's petroleum requirements in 1952 under guidance of the Petroleum Administration for Defense.

To the U. S. domestic industry, such encouragement means an early return to the postwar "normal" trend of mounting imports of crude and products, which, according to estimates of the Bureau of Mines, will reach a new high average of 912,000 barrels daily this year, and a diminishing need for U. S. petroleum exports in world trade.

PAD's interest in foreign petroleum operations stems from its function as the claimant agency for controlled materials purchased in the U. S. by American companies operating abroad and its work with the Department of Interior-sponsored Foreign Petroleum Supply Committee, formed by 19 American firms in mid-1951 to work out the problems of supplying petroleum to nations formerly dependent on Iranian oil.

Under its program of furnishing a minimum of materials from the U. S. to aid operations in foreign nations, PAD has planned crude production of 5,015,000 barrels daily during 1952 in Eastern and Western Hemisphere nations outside the U. S., which would represent an increase of 408,000 barrels daily, or 9 percent above estimated 1951 production in those areas (see Table 1). This anticipated increase by PAD is based on the total program of oil companies operating outside the U. S. for drilling 5443 new wells during 1952. An estimated three-fourths of these total planned wells will be required, according to PAD, to maintain production in 1952 at the rate of last year.

The largest part of the 1952 foreign drilling program is scheduled for the Western Hemisphere, where operators plan to drill 4891 new wells in areas outside the U. S., of which 2000 will be in Canada and 1424 in Venezuela. Included in the Western Hemisphere total drilling program outlined by PAD are 482 new wells listed for Mexico, where all petroleum operations are under control of the government's oil monopoly, Petroleos Mexicanos. The only American participation in this nation's oil industry is through contract drilling for Pemex.

PAD WIELDS great power to influence world crude production from its function as the claimant agency for controlled materials purchased in the U. S. by American companies operating abroad and from its connection with the Foreign Petroleum Supply Committee. It is marshalling these powerful resources to encourage areas outside the U. S. to furnish an increasing proportion of the Western world's oil requirements for 1952. This encouragement is expected to result in 1952 production of 5,015,000 barrels daily in Eastern and Western Hemisphere nations outside the U. S., 5443 new wells and an increase in crude pipe line capacity of 2,457,000 barrels daily.

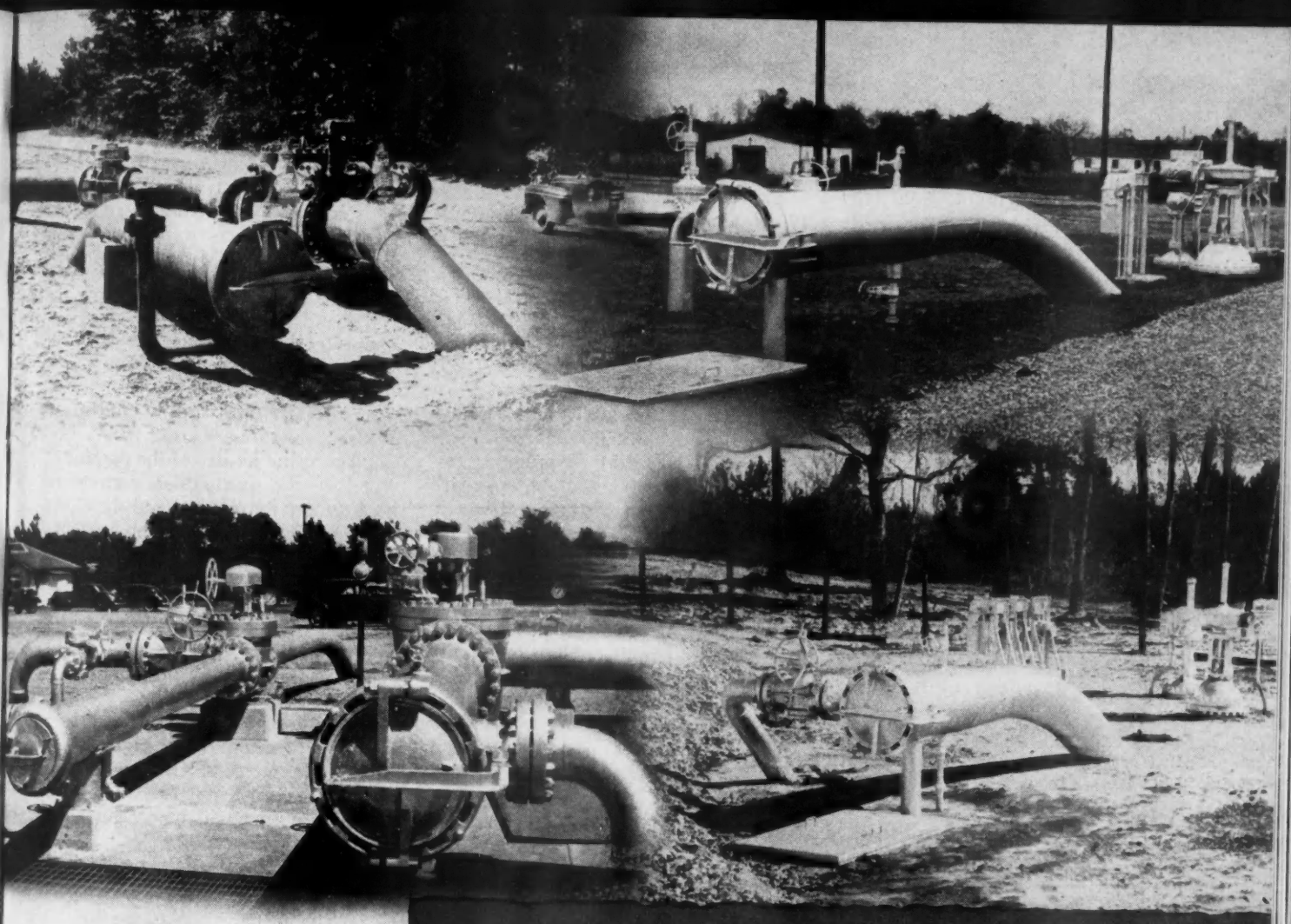
Estimate for Venezuela

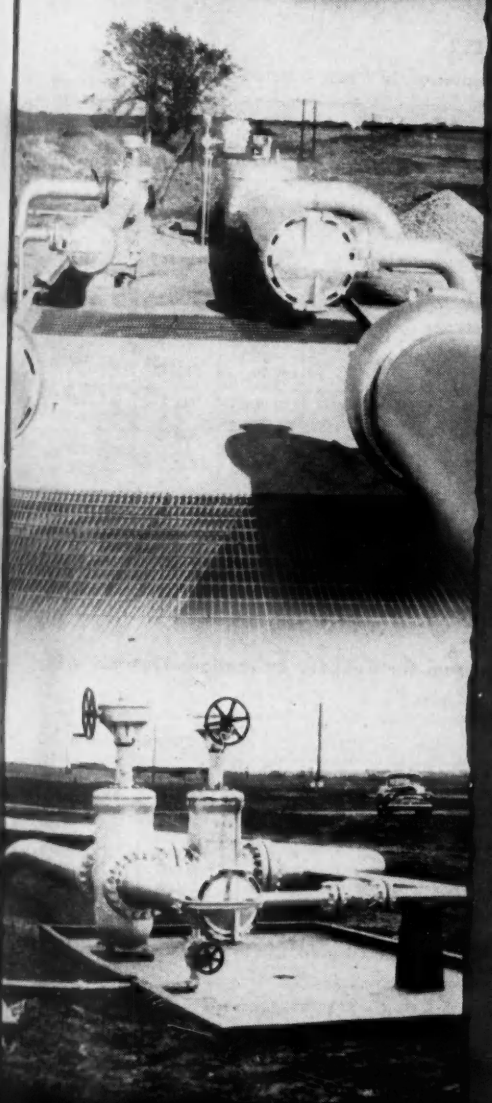
PAD estimates the 1952 drilling program for Venezuela, if realized, would result in a crude increase of 106,000 barrels daily to 1,744,000 barrels daily for all of this year. For Canada, the anticipated production increase would amount to 20,000 barrels daily above the 1951 average to 145,000 barrels a day. Other Western Hemisphere areas would account for an increase of 12,000 barrels a day this year, making the total increase over 1951 for North and South America 138,000 barrels a day. This would mean a total daily average output of 2,395,000 barrels for 1952.

A drilling program of 552 new wells for the Eastern Hemisphere this year is expected to result in an increase of 270,000 barrels daily in the Old World's total production, nearly all of which will be accounted for by increased output in the Middle East.

Completion of pipe line outlets in the Middle East (see Table 2) in 1952, however, will be a more important factor in increased production than the drilling program. The 556-mile Kirkuk field (Iraq) to Banias, Syria, crude oil line of Iraq Petroleum Company is expected to be in operation by the start of the second quarter which, at maximum capacity operation, will add 314,000 barrels daily to Iraq's present 173,000 barrels per day. Another 300,000 barrels daily of pipe line capacity will be added in Saudi Arabia during the year, and 600,000 barrels daily of pipe line capacity will be added from Kuwait's prolific Burgan field to Persian Gulf outlets.

With these increased outlets for Middle East production to Mediterranean and Persian Gulf ports and the large addition of nearly 2 million deadweight tons expected to be added to world tanker fleets during the year, a sharp increase in U. S. petroleum imports is anticipated starting possibly as early as the second quarter. Middle East crude imports to U. S. and Canadian refineries in the fourth quarter of 1951 had originally been scheduled at 220,000 barrels daily, but about 130,000 barrels per day were diverted to European refineries to fill the gap caused by the shutdown of Iranian production. With the sharp rise in Middle East production, which last Decem-





THE EASY WAY TO CATCH A PIG!

UNIBOLT SCRAPER TRAP with oversize barrel

An oversize barrel on the sending and receiving ends of a line, slightly larger than the diameter of the pig, makes it easy to send or catch a pig. Line pressure does the heavy work. But to make the job doubly simple and easy, you need UNIBOLT Hinged Scraper Traps. To open them, all you need do is release two bolts and the blanking plug swings open like a door. No heavy lifting. Nothing to fall on workmen. No time-consuming blind flanges to break out and make up. No danger of leaks. A self-sealing resilient ring assures a pressure-tight closure.

Wherever multi-bolt flanged couplings and closures are now being used . . . on strainers, scrubbers, mist removers, terminal manifolds, blowdowns or other pressure vessels . . . UNIBOLT Couplings will serve you better.

ber reached 1,900,000 barrels daily, or slightly in excess of the Middle East total in February, 1951, when Iran's output of 700,000 barrels daily was included. European plants early in 1952 will receive adequate crude supplies without the need for diversion of Middle East crude intended for the U. S. and Canada.

Imports Rise

The full impact of renewed heavy-volume Middle East imports to the U. S. is not expected until the third quarter, when total imports, according to Bureau of Mines' estimates, are expected to jump from a daily average of 868,000 barrels to 913,000 barrels. During the last quarter, the total is expected to reach a million barrels daily.

While the closing of Iran's Abadan refinery last July boosted export demand for U. S. refined products from a daily average of 202,000 barrels in the first quarter of 1951 to in excess of 400,000 barrels in the last six months, increased refinery capacity throughout the world outside the U. S. (see Table 3) will result in 1952 export demand for U. S. products averaging about 259,000 barrels a day, or 23.5 percent under the 1951 average demand. Export need for U. S. products is expected to decline from 352,000 barrels a day in the first three months of this year to about 174,000 barrels a day during the final quarter.

Total refinery capacity in areas outside the U. S., according to present plans, will be increased by 342,000 barrels daily in 1952 to 4,921,000 barrels a day, and anticipated 1952 crude runs to stills will amount to a daily average of 4,437,000 barrels, an increase of 486,000 barrels over the estimated 1951 average runs. Should this level be reached, approximately 40 percent of the total world refinery throughput this year will be in plants outside the U. S., according to PAD calculations. Under PAD's program to facilitate what it describes as the minimum additional capacity needed to fill both civilian and military requirements, 101,000 barrels daily of additional capacity is planned for construction in the Western Hemisphere and 241,000 barrels daily will be placed on stream in the Eastern Hemisphere.

During the last six months of 1951, foreign refinery operations were stepped up by an average of 500,000 barrels daily with approximately one-half the increase directly attributed to the closing of the Abadan refinery, which supplied Europe with 460,000 barrels daily of petroleum products. The remainder of this gap was filled by refined products exports largely from the U. S. and Middle East.

PAD Predictions

Despite the sharp increases anticipated in production and refinery runs outside the U. S., PAD officials expect generally tight supply conditions in foreign nations during 1952. Regardless of the ability of the combined effort of the companies composing the Foreign Petroleum Supply Committee to avert general shortages in 1951 with less production and refining capacity than will be available in 1952, the PAD forecasters predict:

Aviation gasoline will continue to be in tight supply.

Motor gasoline will be adequate at present quality levels.

Kerosine may be short during some seasons when demand is high.

Gas oil and diesel fuel will be in sufficient supply.

Residual fuel will be in extremely tight supply.

Lubricating oil may be in tight supply.

TABLE 1

Petroleum Administration for Defense Program for Free Nations Outside U. S. for 1952

Country or Area	1952 Drilling Goal (Wells)	1952 Desired Crude Output* (Barrels Daily)	Increase Over Estimated 1951 Daily Average
Canada	2,000	145,000	20,000
Venezuela	1,424	1,744,000	106,000
Mexico	482	210,000	(a)
Peru	275	(a)	(a)
Argentina	246	(a)	(a)
Trinidad	(a)	56,000	(a)
Colombia	(a)	120,000	10,000
Other Western Hemisphere	464	120,000	2,000
Total Western Hemisphere	4,891	2,395,000	138,000
Europe	67	45,000	(a)
Middle East	153	2,240,000	(b)247,000
Far East	274	(a)	(a)
Borneo	(a)	100,000	(a)
Indonesia	(a)	170,000	20,000
India & Pakistan	52	(a)	(a)
North Africa	4	49,000	3,000
Ethiopia	2	(a)	.....
Other Eastern Hemisphere	(a)	16,000	(a)
Total Eastern Hemisphere	552	2,620,000	270,000
Grand Total	5,443	5,015,000	408,000

* Estimated 1952 crude oil production if programmed wells are drilled. PAD estimates three-fourths of the 1952 programmed drilling will have to be completed to maintain the 1951 rate of 4,600,000 barrels daily during 1952. The other one-fourth would account for the contemplated increase of 408,000 barrels daily.

(a) Separate data not listed but included in regional totals. (b) Consisting of 87,000 barrels daily for Iraq and 167,000 barrels daily for remainder of Middle East.

TABLE 2

Crude Pipe Lines Scheduled for Completion in 1952 Outside the U. S.

COUNTRY	Company	From	To	Size (Inches)	Length (Miles)	Capacity (Barrels Daily)
Saudi Arabia	Aramco	Ain Dar	Abqaiq	20–22	20	100,000
Saudi Arabia	Aramco	Uthmaniyah	Abqaiq	30–31	55	200,000
Kuwait	Kuwait	Burgan Field	Ahmadi Farm	20	14.5	300,000
Kuwait	Kuwait	Burgan-Ahmadi	Gravity Loading Line	30	6.5	300,000
Iraq	Mosul	Ainzalah	Kirkuk Line	12	140	26,000
Iraq	Iraq Pet.	Kirkuk	Banias, Syria	30 32 26	233 233 | 556 90	314,000
Iraq	Basrah	Zubair Field	Fao	12 16	65 | 75 10	52,000
Venezuela	Creole	Ule	Amuay	26	125	200,000
Venezuela	Creole	Lagunillas	La Salina	34	25	175,000
Venezuela	Mene Grande	Anaco	Pt. La Cruz	26	30	300,000*
Venezuela	Mene Grande	Oficina	Anaco	16	15.5	290,000*
Venezuela	Shell	Palmarejo	Cardon	30–32(a)	145	200,000

* Includes present and proposed capacity.

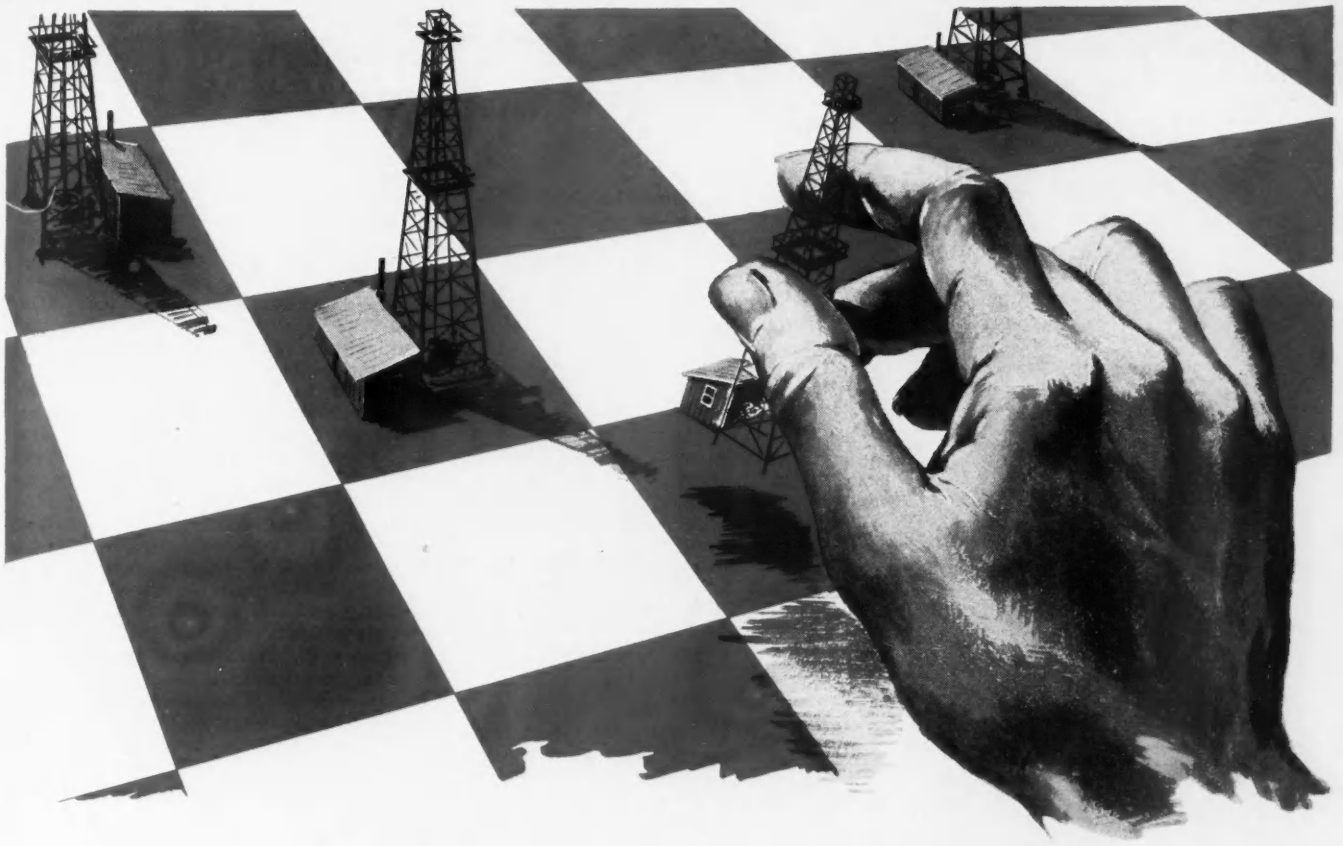
(a) Approximately 10 miles of this line will be 20 inches in diameter under a lake.

TABLE 3

Petroleum Administration for Defense Program for Refinery Operations Outside U.S.

(Barrels Daily)

COUNTRY or AREA	1951		1952		INCREASE '52—'51	
	Estimated Runs	Capacity	Estimated Runs	Capacity	Runs	Capacity
Canada	340,000	365,000	360,000	397,000	20,000	32,000
Other Western Hemisphere	1,589,000	1,695,000	1,689,000	1,764,000	100,000	69,000
United Kingdom	275,000	295,000	400,000	387,000	125,000	92,000
Other Europe	739,000	840,000	920,000	947,000	181,000	107,000
Middle East	668,000	907,000	695,000	924,000	27,000	17,000
Far East	277,000	334,000	303,000	347,000	26,000	13,000
Other Eastern Hemisphere	63,000	143,000	70,000	155,000	7,000	12,000
TOTAL	3,951,000	4,579,000	4,437,000	4,921,000	486,000	342,000



Your first move in Canadian oil

...Check with Canada's First Bank

With 129 branches blanketing the oil-booming Prairie Provinces, the B of M is a close observer of every move in the exciting development of Canadian oil . . . and the confidential adviser of many interested businessmen, in related fields as well as in the industry itself.

For assistance or advice on any move you may be planning in Canada's oil country, call in the bank on-the-scene— the Bank of Montreal, Canada's First Bank.

For your questions about...

Industry developments
Company formation
Taxation and exchange
Lease terms and royalties
Reservation of oil and gas rights
Conservation and production controls
. . . *Consult the B of M.*

FOR A PROMPT AND THOROUGH RESPONSE to your inquiry . . . write, phone or see Gordon V. Adams, Special Representative, Bank of Montreal, Calgary Main Office, 140 Eighth Avenue West, Calgary, Alberta. (Telephone 2-8333).

While the Bank is prepared to provide all available information on the oil industry, it does not make recommendations regarding the purchase of individual oil stocks.

"MY BANK"
TO A MILLION CANADIANS
B of M

BANK OF MONTREAL

Canada's First Bank Coast-to-Coast

570 BRANCHES • RESOURCES EXCEED $2 BILLION

New York . . . 64 Wall Street • Chicago . . . 27 S. La Salle Street • San Francisco . . . 333 California Street

Head Office: Montreal

3 proven ways to get L-O-N-G-E-R Thread Life!

Yes sir . . .
SOLD THROUGH
YOUR FAVORITE
SUPPLY STORE

PETROLEUM DISTRIBUTING COMPANY

BOX 203 - HOUSTON, TEXAS - CHarter 5648

Quality Oil Field Lubricating Oils and Greases

Men in the Industry NEWS

Robert J. Meers has joined Loffland Brothers Company, Tulsa, as chief engineer. After being graduated with a B.S. degree in petroleum engineering from the University of Texas in 1941, Meers was employed by Union Oil Company of California as apprentice engineer. He moved successively through the posts of petroleum engineer, senior petroleum engineer, division engineer, district superintendent, and division superintendent in the Gulf Coast division of that company. Meers had worked for Magnolia Petroleum Company and Cities Service Company before joining Union.

Robert J. Meers

•

A. W. Ambrose, president of Cities Service Oil Company of Delaware, Bartlesville, Okla., has been named chairman of the board. He has been succeeded as president by **S. B. Irelan**, who, since 1944, has been president of Cities Service Gas Company, Oklahoma City. Replacing Irelan in the presidency of the gas company is **Glenn W. Clark**, former vice president and general counsel.

•

F. E. Hatfield has been appointed executive assistant to **J. F. Adams**, vice president, Gulf Oil Corporation, Fort Worth. **G. H. Fisher** has become assistant to the vice president of exploration and manager of the department. **C. D. Cordry** has been promoted to division staff geologist, and **K. W. Paul** is new administrative assistant in the Exploration department.

•

Lloyd F. Worley, president; **Burrell Harrell**, vice president; and **Paul R. Peterson**, secretary-treasurer, have organized the drilling contracting firm of Worley and Harrell, Inc., of Tulsa and Casper, Wyo.

•

Everett O. Stoothoff has been appointed assistant to the secretary of Texas Gas Transmission Corporation. He was formerly assistant secretary and in charge of the Corporate Trust department of Chemical Bank & Trust Company, New York City. He is a graduate of Colgate University, with a B.S. degree, holds a trust certificate from the American Institute of Banking, and attended New York University School of Law.

E. O. Stoothoff

•

Alex Clark, Casper, Wyo., has been named a director and vice president in charge of exploration for Federated Petroleums, Ltd.

Charles W. Alcorn, vice president and manager of Gulf Coast operations for Falcon Seaboard Drilling Company, Tulsa, has been named executive vice president.

In other executive personnel changes, **Jerry L. Strauss**, vice president Mid-Continent area, was made executive vice president and will continue as company treasurer. **Sidney H. Johnson**, manager of Land and Lease department, was made a vice president; and **James L. Brown**, assistant secretary and manager of production, was made a vice president and will assume the duty of cost estimates for wildcatting.

Steve L. Kennedy became assistant to the Gulf Coast executive vice president; and **Jack W. Starr** became assistant to the Mid-Continent area executive vice president and will specialize in the Rocky Mountain effort.

Charles W. Hotchkiss is now assistant to the president and general manager; **P. James Schaff** is assistant secretary; and **Charles M. Bailey**, secretary, is now secretary and assistant treasurer, assuming direct charge of taxes.

•

W. E. Winn has joined Southern Natural Gas Company as manager of the Exploration and Production division. He will be in complete charge of exploration, drilling, geological and production activities of the company, and will also be engaged in the procurement of gas and gas reserves. The company is opening new Exploration and Production division offices in the Carondelet Building, New Orleans.

W. E. Winn

Winn was formerly representative for Ashland Oil and Refining Company in Louisiana, Mississippi and the Texas Gulf Coast region. Before the merger of Aetna Oil Company into Ashland, Winn was vice president in charge of drilling, production, crude oil buying and pipe lines for Aetna. Winn was also for a number of years assistant manager and chief engineer of the Gas department of Sun Oil Company in Dallas.

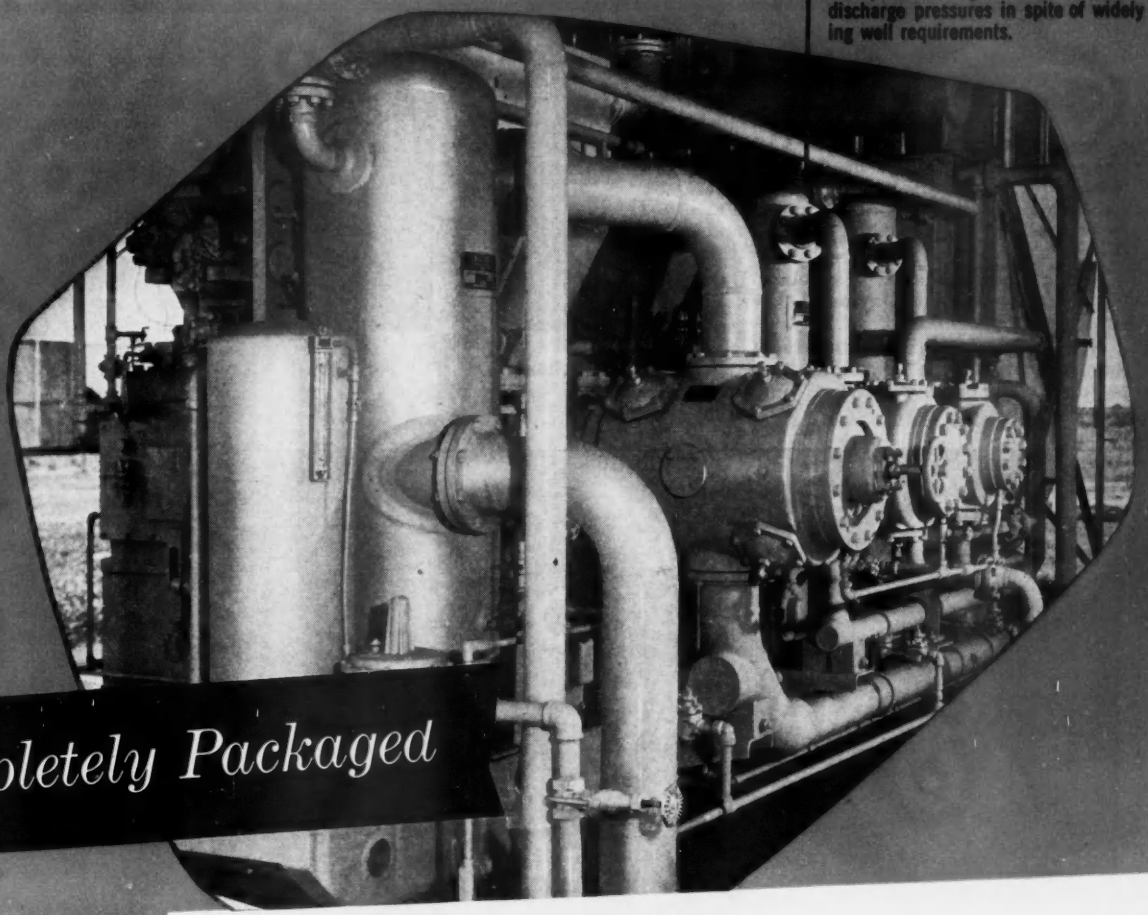
•

George N. Johnson has been appointed district exploration manager for The British-American Oil Producing Company's Southeastern district, with headquarters at Shreveport. He replaces **Guido M. Piggott.** Johnson, a Texas A. & M. graduate, was formerly with Mid-States Oil Corporation and The Atlantic Refining Company in Shreveport.

•

Albert P. Daniels has joined Lowell & Gist, Inc., and the name of the corporation has been changed to Lowell & Daniels, Inc. The firm also announced formation of Lowell Drilling Company, which will operate two of the rotary rigs formerly owned by Lowell & Gist, Inc. Offices remain at 1019 Midland Savings Buillding, Denver.

3-STAGE 330 H.P. 6 SVG
This packaged plant compresses flare gas for a gas lift system in a South Texas oil field. The 4-cycle engine with automatic speed and pressure regulator maintains constant discharge pressures in spite of widely varying well requirements.



Completely Packaged

Custom Engineered

BEAIRD-INGERSOLL-RAND PACKAGED COMPRESSOR PLANT

Every component regularly found in a large permanent compressor installation is built into the Beaird-Ingersoll-Rand packaged compressor plant. The unit is completely assembled in the factory for shipment to the location.

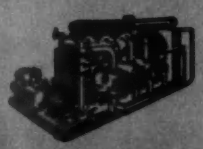
For each installation the gas scrubbers, manifolds, piping and cooling system are custom designed by Beaird process engineers.

MANUFACTURED IN SIZES FROM 110 H.P. TO 440 H.P. FOR USE IN GAS LIFT, FIELD GAS GATHERING, FLARE GAS COLLECTION AND REPRESSURING.

THE J. B. BEAIRD COMPANY, INC. SHREVEPORT, LOUISIANA

SINCE 1918 BEAIRD SHREVEPORT

MACHINING
FABRICATING
STEEL WAREHOUSE



PACKAGED COMPRESSOR PLANTS

L.P.G. SYSTEMS

CAST STEEL FITTINGS

ANHYDROUS AMMONIA EQUIPMENT

PRESSURE BULK STORAGE

T. W. Nelson, director of Magnolia Petroleum Company's field research laboratories in Dallas for the past six years, has been appointed associated director of Socony-Vacuum Oil Company's laboratories. He will make his headquarters in New York and will be responsible for coordination of research in laboratories at Paulsboro, N. J., Brooklyn, N. Y., and Dallas.

Nelson is succeeded at Magnolia's Dallas laboratories by **Dr. Dayton H. Clewell,** former assistant director.

Nelson was graduated from the Colorado School of Mines with a degree in petroleum engineering in 1934, and that year began work for Socony-Vacuum at Augusta, Kansas. After service there and at the company's research and development laboratories at Paulsboro, N. J., he became director of the Dallas laboratories. During World War II he served on technical committees of PAW's aviation program.

T. W. Nelson

D. H. Clewell

Dr. Clewell, who received his doctorate in physics from Massachusetts Institute of Technology, joined Magnolia in 1938 as a research geophysicist. Four years later he was transferred to the field research laboratories as supervisor of exploration research. In 1946 he became assistant director of the laboratories.

Magnolia's laboratories at Dallas are devoted exclusively to research on exploration and production problems.

•

John P. Herrick, Olean, N. Y., oil man, has established a scholarship fund at The Pennsylvania State College in honor of Edwin L. Drake, who drilled the world's first commercial oil well in 1859 near Titusville, Penn.

Herrick, an oil region journalist and publisher in the 1890's and a successful oil producer for more than 40 years, has been a member of API and the Pennsylvania Grade Crude Oil Association since they were formed. He is the author of "Empire Oil," a book about oil in the state of New York.

•

Harry Dereniuk has been promoted to chief primary engineer of Deep Rock Oil Corporation with headquarters in Tulsa. He was formerly district engineer in the company's Wichita Falls office. Before joining Deep Rock Dereniuk was in charge of the Engineering department of a southwestern gas company. He is a petroleum engineering graduate of the University of Oklahoma.

Harry Dereniuk

•

Sewell B. Evans, an employe of The Pure Oil Company since 1922, has been appointed superintendent of the Detroit Southern Pipe Line. He succeeds **George E. Weber,** resigned. Evans, who has also worked for Pure in Ohio and Oklahoma, went to Michigan in 1932 when the Detroit Southern Pipe Line started.

•

Richard N. Spencer has resigned as district geologist for Union Oil Company of California in South exas to join Fitzpatrick Drilling Company, Corpus Christi, and A. C. Allyn and Company, Chicago, as geologist. Fitzpatrick Drilling Company has offices in the Wilson Tower, Corpus Christi.

•

T. F. Lawry, formerly with Deep Rock Oil Corporation, has joined Kewanee Oil Company as division engineer in Illinois.

ASK THE ROYAL ABOUT CANADA'S OIL

Branches throughout Canada's oil-rich western plains. On-the-spot information available through J. C. Mayne, Supervisor, Calgary, Alberta, or Head Office, Montreal

Assets exceed $2,500,000,000

We do not provide information on oil securities

THE ROYAL BANK OF CANADA

Over 760 branches in Canada and abroad

FOR FREEDOM TO THRIVE

FRICTION MUST STAY THROTTLED

It's a terrifying vision . . . to imagine how swiftly friction, if left unbridled, could bring about the disintegration of our Nation's freedom and economy. But it could happen.

Take, for example, *mental* friction. How long could peaceful minds remain untainted, how long could our liberty survive if America should once drop its guard against subversive influences and fail to succeed in stemming the Communist tide?

Or take, for example, *metal* friction. How long could America produce the things that keep us free and mighty, should friction ever be allowed to freeze the wheels of industry?

Without bearings America would be without hope.

The Aetna Ball and Roller Bearing Company is vigilantly alive to its responsibilities as one of the leading suppliers of the anti-friction products so essential to the Nation's vital civilian and military equipment builders. It will continue to direct the results of its best thinking, best experience and best craftsmanship toward further improvements in its service to these indispensable industries. For upon them the security of our nation largely hinges.

AETNA BALL AND ROLLER BEARING COMPANY
4600 Schubert Avenue • Chicago 39, Illinois

BALL AND ROLLER BEARINGS • MISCELLANEOUS PRECISION PARTS

Transfers and Promotions:

C. A. Ward, Continental Oil Company's district superintendent at Brownfield, Texas, has been transferred to Wichita Falls, Texas, in a similar capacity to replace **C. C. Wilson**, transferred to Hobbs, N. M. **D. F. Jacobs**, assistant district superintendent at Hobbs, has been promoted to district superintendent at Brownfield. **J. R. Chestnelvick**, area production engineer, Fort Worth, was promoted to assistant district superintendent at Hobbs. . . . Sinclair Oil and Gas Company announced the following reassignments of production department supervisors: **R. A. Wright**, division superintendent at Midland, Texas, promoted to assistant general superintendent and transferred to Tulsa; **Floyd Brett**, assistant general superintendent, has returned from a leave of absence as assistant to the director, Production division, PAD, to resume his duties in Tulsa; **J. A. Jackman**, assistant division superintendent at Casper, Wyo., transferred to Independence, Kansas, serving in the Kansas-Tri-State division; **W. T. Crandell**, division superintendent at Fort Worth, Texas, transferred to Midland, Texas, to head the West Texas-New Mexico division; **J. B. Kennedy**, assistant division superintendent at Midland, transferred to Casper to head the Wyoming-Montana division; **Connie L. Wilson**, division engineer at Fort Worth, transferred to the General Production division at Tulsa; **William J. Rogers**, transferred from Fort Worth to Midland as division engineer; **George H. Gray**, division engineer at Midland, transferred to Fort Worth and attached to the general staff in charge of proration matters for the State of Texas.

R. M. Kobdish, division engineer for Sinclair Oil and Gas Company, Tulsa, has been transferred to Crane, Texas, and promoted to district superintendent. **Ralph E. McAvoy**, assistant district superintendent at Oklahoma City, has transferred to Sterling, Colo., and **John M. Clevenger**, assistant district superintendent, Crane, transferred to Big Spring, Texas, and promoted to district superintendent. **George V. Dunn**, seinor petroleum engineer, Seminole, Okla., transferred to Lindsay, Okla. **Donald W. Bennett**, senior petroleum engineer at Delaware, transferred to Kiefer, Okla. Intermediate petroleum engineers who have been transferred include **Winfield S. Hull**, from Kiefer to Covington, Okla.; **Edward H. Whitlock**, promoted to senior petroleum engineer, from Ardmore, Okla., to Seminole; **John V. Graham**, from Lindsay to Ardmore; **James W. Curmutt**, from Wink, Texas, to Odessa, Texas; **John P. Hammett**, from Hobbs, N. M., to Wink, and **Julian M. Simpson**, from Odessa to Hobbs. Junior petroleum engineers who have been promoted to the intermediate classification are **Lindal C. Buchanan**, transferred from Ardmore to Kiefer; **C. L. Simons**, Thrall, Kansas, and **Jack P. Anderson**, Wichita, Kansas.

In Magnolia Petroleum Company's Producing division, **C. F. Stephenson**, Shreveport district superintendent, was transferred to the new Pegasus district with headquarters at Midland, Texas. **Leonard O. Franklin**, petroleum engineer in the Kermit district, was promoted to district petroleum engineer in the Pegasus district with headquarters at Midland. **H. V. Harden**, Louisiana-Gulf district superintendent with headquarters at Morgan City, La., was transferred to Shreveport district to succeed Stephenson. **Ernest B. Etheridge**, **petroleum** engineering assistant in the Falfurrias district, was promoted to assistant foreman at Shreveport. . . . **M. E. Bay** has been promoted to district superintendent of Magnolia Pipe Line Company's North Texas district with headquarters at Wichita Falls. He replaces **H. F. Smith**, retired. **R. L. Council** was named chief dispatcher, replacing **F. P. Childress**, retired, and **C. A. Eaton, Jr.**, was promoted to assistant chief dispatcher.

●

John M. Vetter has been elected first vice president of Pan American Gas Company, Houston. Vetter is also first vice president of Pan American Production Company.

●

Jack Durkee has been named district landman at Jackson, Miss., for The Carter Oil Company, replacing **Rhea J. Smith**, promoted to division landman and transferred to Shreveport.

●

Carl F. Beilharz, formerly Gulf Coast division geologist for The Pure Oil Company, has resigned to open geological consulting offices at 805 Southern Standard Building, Houston.

OUT TO STAY! The old jinx of profit-robbing paraffin in pumping wells can be eliminated with Sunshine Iron Works M-25 paraffin scrapers.

NOTE THESE ADVANTAGES OF THIS FIELD PROVEN SCRAPER:

- **Can be easily installed on the job—in the field.**
- **Scraper stays put—grip tested to 5000 lbs.**
- **Spiraled design exerts continuous shaving action to prevent paraffin accumulation.**
- **Heavy construction means long, dependable service.**
- **Field proven—in use in every area where paraffin is a problem.**

ORDER A SUPPLY TODAY!

Write for complete catalog of Sunshine Iron Works Paraffin control equipment.

SIW

SUNSHINE IRON WORKS

601 W. MURPHY ODESSA, TEXAS

TWO DEPENDABLE, CONSISTENT MATERIALS...

Tops in the field

...for lightening cement slurries

...for restoring lost circulation

with excellent bridging effectiveness...

Strata-Crete* the lightweight, processed perlite aggregate not only permits higher columns at lower pressures... but also bars loss of cement slurry... greatly reduces perforation cracking or shattering.

with excellent bridging qualities...

Strata-Seal* has *proved* its superiorities in well after well... chemically inert, is not affected by mud or heat... permits screening... cuts rig downtime... often saves abandonment.

**Trade Mark GLCC*

STRATA-CRETE SALES
GREAT LAKES CARBON CORPORATION
5845 Atlantic Ave., Long Beach 5, Calif.
Offices in Principal Oil Centers

In the States of Texas, Louisiana, Oklahoma, Kansas and New Mexico Strata-Crete and Strata-Seal are available only through Great Lakes Corporation, Long Beach 5, Calif.

Packed in 4 cu. ft. bags. Available through Leading Oil Well Cementing Concerns; Leading Mud Service Companies. Write for more data.

DEATHS

Charles P. Clayton, 78, former associate of the late John Gates, a founder of The Texas Company, died January 17 at Hutchinson, Kansas. Clayton went to the Gulf Coast area at the turn of the century to prospect for salt and is credited with advancing the theory that salt domes formed traps for oil. Gates later formed an oil producing company which was absorbed by The Texas Company, and Clayton became Texas division superintendent. He resigned from Texaco in 1915 and formed Clayton Oil and Refining Company at Dallas. He retired from the oil business in 1932.

•

Luther Franklin Cleveland, 52, assistant tax counsel for Sunray Oil Corporation, died January 20 in Tulsa. He had previously been with Sinclair Oil and Gas Company and Darby Oil Company.

John McCowan Peat, 71, former Shell Oil Company purchasing and stores manager in Los Angeles, died at Carmel, Calif. Peat started with Shell in 1909 as storekeeper at Oilfields, Calif. He retired on January 1, 1945.

•

Francis C. Wilson, president of Wilson Oil Company, Santa Fe, N. M., died January 17. He was director of Independent Petroleum Association of America.

•

W. R. Briggs, 60, Southwest Texas division manager for United Gas Corporation, died January 12 at New Braunfels, Texas.

Joe R. Bradley, veteran employe of Stanolind Oil and Gas Company, died January 20 in Tulsa. He had been in the company's accounting department for 23 years and was transferred to Tulsa from Fort Worth in 1933.

•

Raymond C. Gaugler, 59, president of American Cyanamid Company, died January 11 at Larchmont, N. Y.

•

Franklin D. Stickler, 62, Kansas independent oil operator, died January 9 in Wichita, Kansas.

•

Robert M. Dillard, superintendent of the Paloma Unit Cycling operations of Western Gulf Oil Company, died in Bakersfiield, Calif., December 24. He had been with Gulf 24 years, spending all but the last eight years with Gulf Oil Corporation in Louisiana and Texas.

•

F. E. Lacaze, 63, an employe of United Gas Pipe Line Company and its predecessor firms more than 37 years, died January 22 in Shreveport. He was Shreveport district superintendent of Atlas Oil and district manager for United Gas from 1919 until his retirement in May, 1949.

•

Ward Blackburn, 68, president of Vernon Tool Company, Ltd., Alhambra, Calif., died January 27. Blackburn, a graduate of the Colorado School of Mines, was active in the California Natural Gas Association and the Western Oil and Gas Association.

•

James Leftwich, 82, a founder of Lomore Oil Company, died January 27 in Arlington, Texas.

•

Ernest Edward Morey, 70, veteran Pipe Line department employe of Mid-Continent Petroleum Corporation, Tulsa, died January 29. He had been with Mid-Continent 34 years.

•

James A. Rafferty, 65, vice president and director of Union Carbide and Carbon Corporation, died December 19 at Fort Lauderdale, Fla.

•

John O. Goes, 48, district superintendent in Kansas for Midstates Oil Corporation, died December 17 as the result of injuries suffered in an automobile accident.

•

Crayton H. Bates, 74, former purchasing agent for the old Prairie Oil and Gas Company, died December 19 in Independence, Kansas.

•

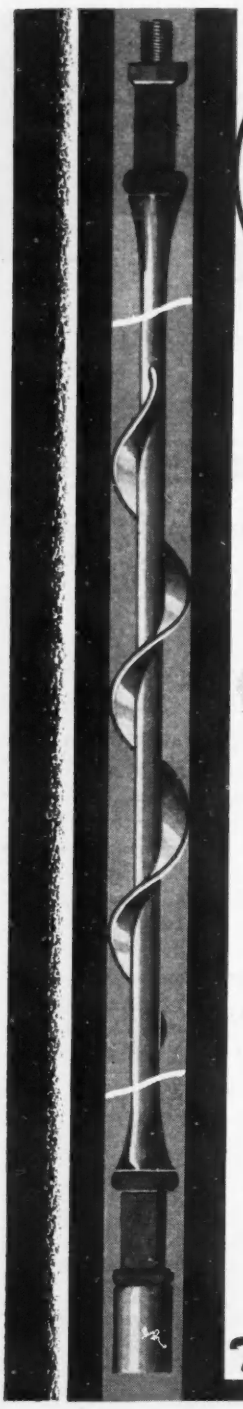
A. H. (Dick) Richardson, 67, veteran wildcatter, died January 10 in Dallas. Richardson opened the original Brown County, Texas, field in 1916.

•

Harry H. Ford, 70, Houston independent oil operator and one of the developers of Hoskins Mound in Brazoria County and Hastings field in Harris County, Texas, died January 12.

•

W. H. Hager, 52, independent geologist, died at his home in Houston. He was a graduate of the University of Nebraska, a veteran of World War I, and a member of the American Association of Petroleum Geologists.



REMOVES PARAFFIN
•
NO WELDING NECESSARY
•
SAVE TIME • MONEY

INSTALLED AT WELL

AT THE WELL SITE the scraper is applied by a crew member using any simple tool, such as screw driver or tire iron. And . . . after applying a few scrapers a crew member gets the hang of installation and really moves along so that he installs quickly and efficiently one scraper after another.

TRIPLE SPIRAL
PARAFFIN REMOVERS

* IS NOT WELDED in any way.
* CAN BE SALVAGED and used again on new rods.
* Eliminates cost of rod handling and transportation to factory or shop for installation.
* Spaced for any stroke length.
* Will not slip if rod is stressed—tested for 2350 lbs. grip.
* Now in use in EVERY AREA where paraffin is a problem.
* Sizes available for IMMEDIATE DELIVERY to fit 5/8" to 1" rods in 2" to 3" tubing.

Distributed by Sucker Rod Manufacturers
AVAILABLE THRU YOUR SUPPLY STORES
MANUFACTURED BY
The TRIPPLEHORN CO. P. O. BOX 6326 DALLAS, TEXAS

Over a Quarter-Century Experience in Controlling Well Pressures...

For ALL your pressure control needs YOU CAN DEPEND ON SHAFFER!

For well over a quarter of a century, the Shaffer name has meant continued leadership in dependable equipment to meet all types of pressure control problems . . . on wells of all depths . . . under the widely-varying operating conditions of the oil industry. Leading operators prefer Shaffer equipment, not only because it represents the utmost in rugged dependability—*but also because they gain so many other vital advantages —in greater compactness, greater adaptability, greater operating simplicity and ease of installation—when they standardize on Shaffer equipment.* Here are a few typical examples . . .

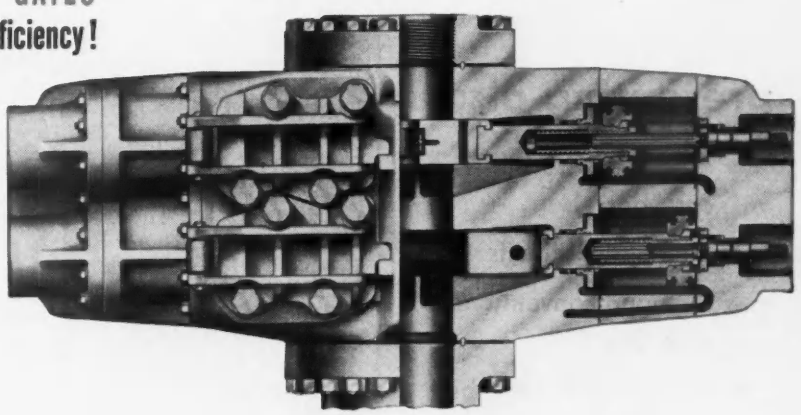
SHAFFER HYDRAULIC CELLAR CONTROL GATES

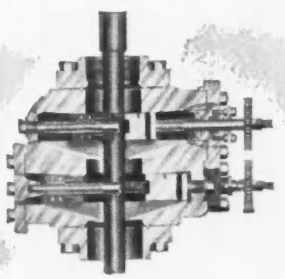
. . . Revolutionary in compactness, simplicity, efficiency!

Available in both Double (illustrated right) and Single types. Both types are amazingly compact—Double type only 30" high, Single type only 18½" high, even in sizes as large as 13⅜" (12" Series 900).

Rams are changed by simply opening side doors, replacing rams, then closing and bolting the doors. *And rams can be changed whether pipe is in or out of the hole!*

With all moving parts completely enclosed, this Gate is ideal for *all* drilling operations. There are many other important advancements built into this Gate, so be sure to get the complete story before you invest in *any* control gate equipment. Available in a complete range of sizes and pressure ratings!

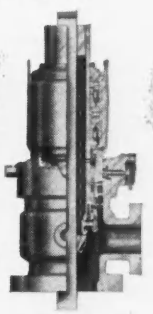




SHAFFER MECHANICAL CELLAR CONTROL GATES

- Available in both Double (illustrated above) and Single types for operation by air, electric or steam drive —*plus complete manual stand-by operation!*
- Require minimum space—less than 29" for Double, 19" for Single, even in sizes as large as 13⅜" (12" Series 900).
- Self-Draining Ram Compartments, with no place for detrimental mud to accumulate and interfere with free ram travel . . . Quick, Easy Ram Changes by simply removing *one* end cover . . . and many other unique features make these gates outstanding in their field.

Domestic or overseas, wherever your operations call for mechanically-operated cellar control gates, Shaffer has the most advanced design available!

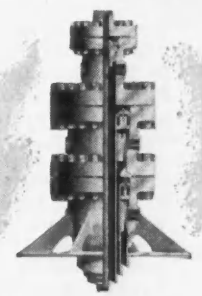


SHAFFER COMBINATION ROTATING BLOWOUT PREVENTERS AND STRIPPERS

—Combine in One Unit Every Necessary Feature for Complete Pressure Control While Drilling.

- Can be used with *any* standard kelly —square, hexagonal or octagonal; any type drill pipe—coupled, upset or flush. No special strings or equipment needed!
- Maintains continuous seal around pipe, couplings, tool joints, upsets, subs, drill collars, etc. *automatically* —whether string is rotating, being raised, lowered, or is stationary.
- Quick Releasing Bonnet permits lifting bits, reamers, other large-diameter tools through the unit quickly, easily, . . . and many other unique features!

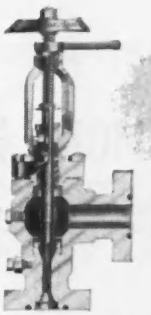
Nothing equals this unit for maintaining complete pressure control while the drill string is in the well. Available in a complete range of sizes.



SHAFFER LANDING HEADS AND TUBING HEADS

—Meet Every Requirement for Modern Compact Casing and Tubing Suspensions The World Over.

- Available in various types and packing arrangements. Base Heads and Combination Base, Casing and Tubing Heads are available for combining several units into one where space is at a premium.
- Shaffer provides a full line of modern Tubing Heads, Multiple Zone Hook-Ups and other equipment to complete your pressure control installation—for conditions anywhere in the world!



SHAFFER ADJUSTABLE FLOW BEANS

—The Pioneer Adjustable Flow Bean that Provides Operating Features Unequalled By Any Other Equipment.

- Available with Conical, Micro and electrically-heated Thermo Tips in both regular and hard metal designs to meet various drilling, production and refinery applications. All popular sizes—in both flanged or screwed connections—to meet your particular requirements.

ALSO, SHAFFER FISHING TOOLS!

In addition to pressure control equipment, Shaffer also provides one of the most complete lines of dependable fishing tools in the industry. Not only all conventional types—but many tools that are unique in operation and purpose. Write for complete information!

Send for your free copy of the new 1951 Shaffer Catalog. See pages 4525 to 4600 of your 1951 Composite Catalog for additional Shaffer data.

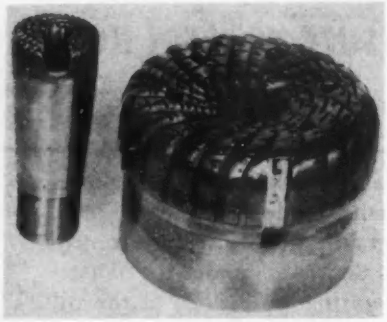
SHAFFER

HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

SHAFFER TOOL WORKS, Brea, California • California Service Shops: Santa Fe Springs and Taft
HOUSTON, TEXAS, 6006 Navigation Blvd. • ODESSA, TEXAS, 1925 West Second Street
OKLAHOMA CITY, OKLAHOMA, Acme Oil Tool Company, 1001 S. E. 29th Street
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 1788
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.

28 years OF OIL TOOL LEADERSHIP

featuring



the new ***SPRABERRY BIT*** . . . the highly successful new ***DIAMOND BIT*** especially designed for the Spraberry formation.

presenting also

- diamond wire line core barrels
- diamond drill bits
- diamond conventional core bits
- conventional core bits

DISTRIBUTED BY

DIAMOND BIT CO.

DALLAS • 3007½ Knox Ave. • LOgan 7221
MIDLAND • ODESSA AIR TERMINAL
Tel. 2-2296 Tel. 7-9162
P. O. BOX 166, TERMINAL, TEXAS

•

BIT RENTAL SERVICE, INC.
MIDLAND

•

WIRE LINE CORING CO.
MIDLAND

•

MANUFACTURED BY
WILLIAMS BIT & TOOL CO.
Greenville, Texas

The first Diamond Bit Manufacturer in the Southwest

Associations

Petroleum Electrical Group Will Meet in April at Tulsa

The Petroleum Industry Electrical Association will hold its annual meeting at the Mayo Hotel, Tulsa, April 14-17. About 700 communications officials and technologists from 21 states are expected to attend.

Al Stegner, engineer with Tennessee Gas Transmission Company, Houston, is president of the association, and M. C. Callahan, Gulf Oil Corporation, Tulsa, is chairman of the host convention committee.

Exhibits of new products used by the oil industry will be displayed in the Cimarron Ball Room under the auspices of the affiliated group, the Petroleum Electrical Supply Association.

The program will open on Monday with a directors' meeting and a preconference luncheon. Both open and business meetings that day will be held jointly by PIEA and PESA.

Papers scheduled for the Tuesday sessions include "Coordination of Petroleum and Power Company Problems," by W. H. Steuve, consulting engineer, Oklahoma City; "Oil Field Distribution Systems," by B. L. Moore, Humble Oil & Refining Company, Houston; and "Microwaves in Operation," by C. B. Lester and C. A. Compton of Mid-Valley Pipe Line Company, Longview, Texas.

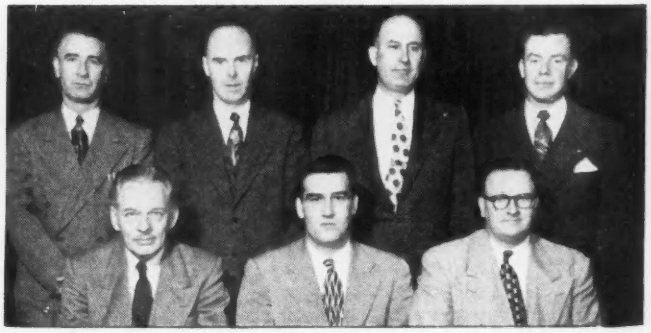
R. J. Osborn and Glen Ladd of Sinclair Pipe Line Company, Independence, Kansas, will present a paper on Wednesday concerning the question, "Is Present Design of Equipment for Hazardous Locations Practical or Economical?" Also on Wednesday, the Corrosion Section will have a luncheon and round table discussion. Another paper on the day's program is "Operating Techniques of FM Communications," by C. W. Evans and W. H. Craig, United Gas Pipe Line Company, Shreveport.

On Thursday, the group will hear "Utilization of Company Owned Wire Line Facilities," by H. L. Wheeler, Service Pipe Line Company, Tulsa; "Chemical Brush Control," by Homer L. Jacobs, Davey Tree Expert Company, Kent, Ohio; "Frequency Measurement Techniques," by Len Cutler, Gertsch Products, Inc., Los Angeles; and "The Supervisors' Responsibility in Safety," Don Attaway, Arkansas Fuel Oil Company, Shreveport.

Union Oil Vice President Heads Production Pioneers

A. C. Rubel, of Union Oil Company, has been elected president of Petroleum Production Pioneers, and A. E. Fowks, retired Union Oil executive, was named honorary president.

Other officers are Earl M. Daniels, Hydril Company, vice president; T. J. Hickey, Hickey Pipe & Supply Company, honorary vice president; G. S. Follansbee, Jr., Universal Consolidated Oil Company, treasurer; and R. Sneddon, secretary.



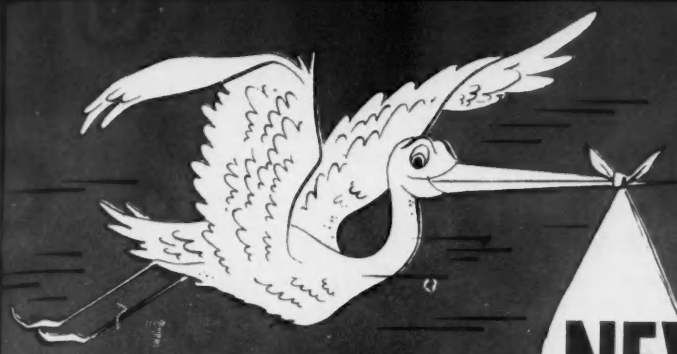
DIAMOND CORE DRILL Manufacturers Association's Technical Committee members are, front row, left to right, George C. Winther, R. F. Norrick, Munsey Waters; back row, I. F. Schenewerk, Jr., Adrian Ross, M. L. Tucker, and Raymond Jones.

Specify **PELCO** Welding Saddles

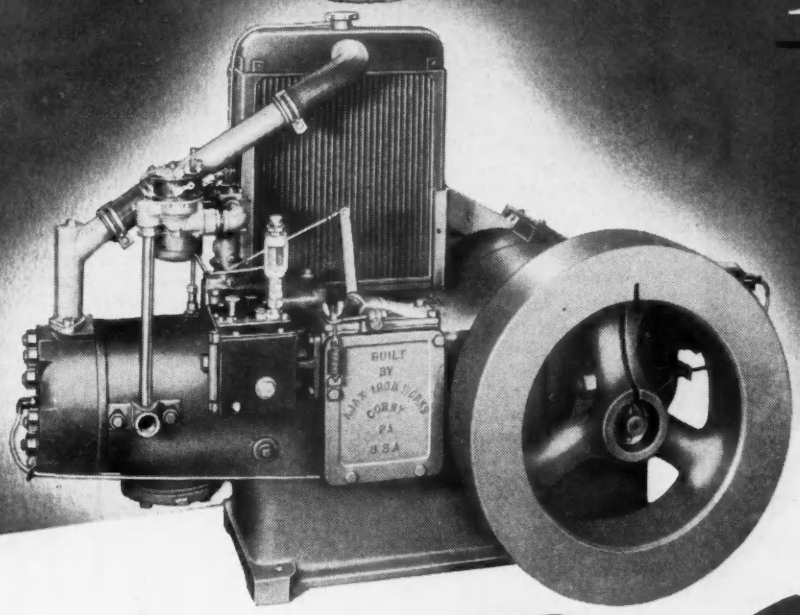
PELICAN WELL TOOL & SUPPLY CO.

P. O. Drawer 1108
Shreveport (84), La.

SEE YOUR NEAREST SUPPLY HOUSE



THERE'S A GREAT **NEW BABY** at *Ajax!*



THE *Ajax* 5" x 6½" GAS ENGINE

LONG LIFE **LOW MAINTENANCE**

plus every advantage of large, medium speed types

Meet the Little Giant among gas engines—built like a big one, bulging with muscle, yet has but a tiny appetite for fuel! This is *the* engine for "start it and forget it" pumping service, where the big boys are not required. ● See the new AJAX 5" x 6½" at your nearest supply store!

AJAX ENGINES

AJAX IRON WORKS

Manufacturers of Gas Engines • Steam Drilling Engines • Industrial Steam Engines

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., TOLEDO, O. R. B. MOORE SUPPLY CO., INC., BOLIVAR, N.Y.
BETHLEHEM SUPPLY CO., TULSA, OKLA.

Petroleum Education Needs Will Be Probed at AIME Meet

A panel discussion on petroleum engineering education will be a part of the Petroleum Branch program at the annual meeting of the American Institute of Mining and Metallurgical Engineers February 18-21 in New York City. Discussing the question of standardization of curricula in the petroleum engineering schools of the nation will be Dr. John C. Calhoun, Jr., Pennsylvania State College; Dr. H. G. Botset, University of Pittsburgh; Dr. H. H. Power, University of Texas; and Dr. C. F. Weinaug, University of Kansas.

Petroleum sessions will begin with a paper entitled "Natural Gas in the Province of Alberta, Canada," by J. F. Dougherty of Empire Trust Company, and Anthony Folger, Howard Lowe and Joffre Meyer, all of DeGolyer and MacNaughton.

Monday afternoon, February 18, Ralph E. Hartline and Wilfred H. Tapper of Halliburton Oil Well Cementing Company, will give their paper "The Strataflow Process:: A Recent Development in Locating Water Entry in Wells." Following will be the paper, "Significance and Implications of the Growth of the Petroleum Industry," by Stuart E. Buckley of Humble Oil & Refining Company.

Tuesday morning, 19, John M. Campbell and Robert N. Maddox of Black, Sivalls and Bryson, Inc., will present their work on "Processing and Recovery of Light Hydrocarbon Liquids in the Field — An Economic Study." The financial aspects of the American petroleum industry will be discussed in a paper entitled "Capital Formation in the Petroleum Industry," by Frederick G. Coqueron and Joseph E. Pogue of The Chase National Bank. Rounding out the Tuesday morning session will be the paper, "The Part of the Petroleum Engineer in the Oil Industry Information Program," by Robert E. Featherston of the API, and a movie, "Salt Water Disposal in the East Texas Field," shown by W. S. Morris of the East Texas Salt Water Disposal Company, Kilgore, Texas.

The Tuesday afternoon session will be devoted to a roundup of world oil and gas developments during 1951, information gathered by the Production Review Committee headed by E. W. Berlin of Standard-Vacuum Company, New York.

The annual Petroleum Branch dinner will be held Tuesday evening with Richard W. French, branch chairman, presiding. John M. Lovejoy, president of the Seaboard Oil Company of Delaware, will be the speaker.

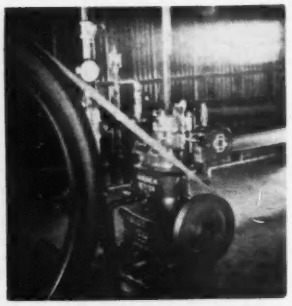
TIPRO Executive Committee Meets to Plan Convention

Final plans for the sixth annual meeting of the Texas Independent Producers and Royalty Owners Association will be completed when the TIPRO executive committee meets in Austin, Texas, February 25. The association convention will be held in Fort Worth on March 27 and 28.

The committee will hear reports from special subcommittees on oil imports, crude oil prices, steel tubular goods allocation, and natural gas. A theme of the meeting will be "oil and education."

John R. Penn, Jr., and Gaylord H. Chizum, both of Fort Worth, are co-chairmen of the meeting.

DALLAS GEOPHYSICAL Society officers for 1952 are, left to right, C. G. Dahm, Magnolia Petroleum Company, secretary-treasurer; J. P. Woods, The Atlantic Refining Company, president; Milton B. Dobrin, Magnolia, first vice president; and Howard Cobb, Atlantic, second vice president.

SECONDARY MODERN RECOVERY
TECHNICAL CONSULTING
PRODUCTION ENGINEERING
SERVICE, INCLUDING
CORE ANALYSIS
PRESSURE MAINTENANCE WITH GAS OR WATER
REPRESSURING WITH GAS OR WATER
Two-stage Water Cooled Gas Compressor For Shallow Lease Repressuring Driven by Pumping Engine

YOUNG COUNTY, TEXAS
SURVEYS
ESTIMATES
DESIGN
INSTALLATION
SUPERVISION
PETROLEUM ENGINEERS
CABLE & STAPLES
WICHITA FALLS, TEXAS

QUICK, ACCURATE RESULTS LESS EFFORT
Curtin CENTRIFUGES

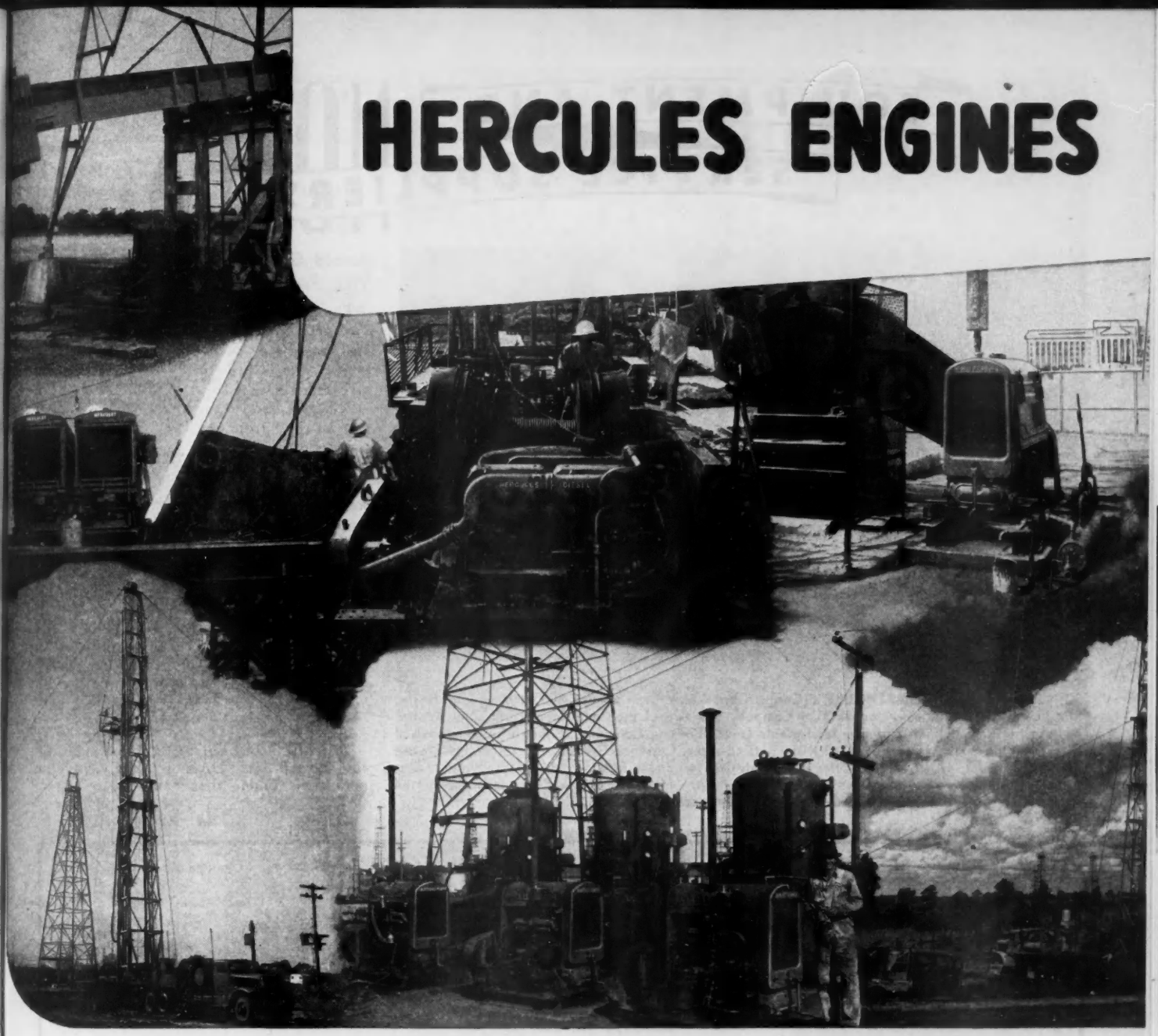
No. 3420
15 c.c. machine . . Cranks and heads interchangeable with 100 c.c. machines.
Simple in design . . . Ruggedly built . . . Requires no special care . . . Gear Ratio and throw of crank produce required speed with no strain. Curtin Centrifuges meet all A.S.T.M. Standard Method D-96 and A.P.I. Code No. 25 requirements. Fully descriptive literature upon request.
W·H·CURTIN & CO.
HOUSTON . . . . NEW ORLEANS.

CONTACT YOUR FAVORITE SUPPLY HOUSE
STANDARDIZE ON
PARMACO CASING AND DRIVE SHOES
SIZED CORRECTLY
PARKERSBURG MACHINE CO. PARMACO PARKERSBURG, W. VA. U.S.A.
The House of Courteous Service

Standco NO-SMOKE
STANDCO BRAKE LINING
Nothing novel—no bunk, but it gets the job done without scoring brake rims. See pages 3973-3978 Composite Catalog.
Standco Brake Lining Co.
HOUSTON

HOUSTON LABORATORIES
Analytical and Consulting Chemists
Hydrocarbon Gas Analyses, Reservoir Equilibria Studies for Crude and Condensate Well, Waters, Brines, Corrosion and Industrial Analyses.
Phone CApitol 1319, Box 132, Houston, Texas

HERCULES ENGINES



Provide dependable power for

Oil Field Service

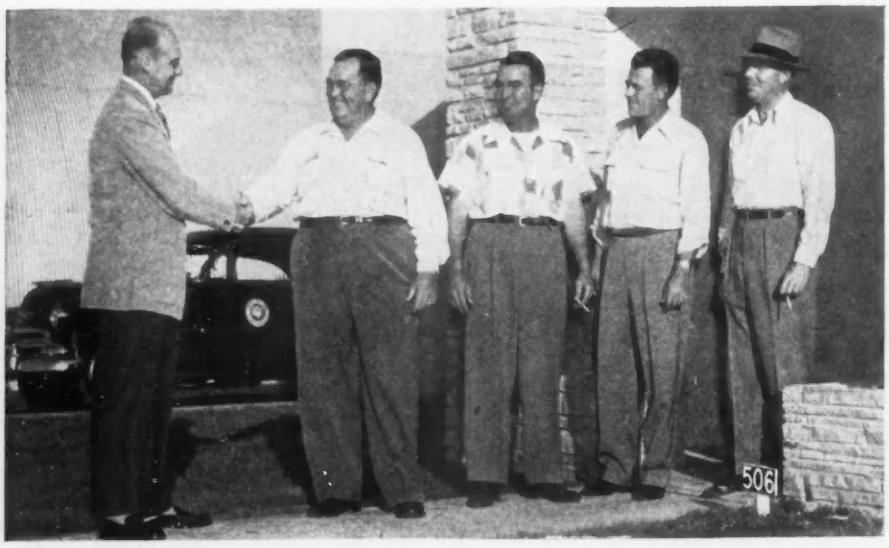
Engine Specialists Since 1915

Gas • Gasoline • Diesel
Butane • Propane
Kerosene

■ Drilling . . . pumping . . . exploration . . . production . . . transportation . . . wherever dependable power is needed . . . one name stands out as a symbol of outstanding performance and economy. It is Hercules Power . . . high-speed, heavy-duty, gasoline, gas, kerosene, L. P. G. or diesel power. Hercules engines and power units are built in a wide range of power to meet the broad, versatile needs of the rapidly expanding oil industry. For your specific requirements contact the Hercules oil field branch nearest you or write:

HERCULES MOTORS CORPORATION • Canton 2, Ohio, U. S. A.

EQUIPMENT AND SERVICE SUPPLIERS' NOTES



JOINT OFFICES AND WAREHOUSE in Corpus Christi have been opened by Cameron Iron Works, Baash-Ross Tool Company, Hughes Tool Company and Arnold Pipe and Supply Company. Walter Kalteyer, left, equipment engineer for Humble Oil & Refining Company, is shown being welcomed by the equipment representatives, who are, left to right, Clarence Griffith, special representative for Hughes Tool; H. Z. Brown, sales representative for Baash-Ross; F. H. Isaacs, South Texas division manager for Cameron Iron Works; and Dick Arnold, head of Arnold Pipe and Supply and owner of the new warehouse.

Baroid General Manager Is Elected Vice President of National Lead

George L. Ratcliffe has been elected a vice president of National Lead Company. He has been a member of the board of directors since 1948.

G. L. Ratcliffe

Ratcliffe, who was graduated from the Carnegie Institute of Technology as an electrical engineer, joined National Lead in 1929. At that time he was president and general manager of the California Talc Company, one of the predecessor companies to the present Baroid Sales Division. Prior to the organization of California Talc, Ratcliffe saw service with Standard Oil Company (N.J.), Texas Pacific Coal and Oil Company and General Petroleum Corporation.

Ratcliffe has been general manager of the Baroid Sales Division since company operations under that name were begun in 1939.

WHITNEY NATIONAL BANK
OF NEW ORLEANS

ESTABLISHED 1883

CONDENSED STATEMENT OF CONDITION
DECEMBER 31, 1951

ASSETS		LIABILITIES		
Cash and Due from Banks	$131,621,211.47	Deposits		$385,222,353.86
U. S. Government Obligations	161,119,817.79	Acceptances		2,225,970.73
State, Municipal and Other Public Bonds	14,098,149.71	Dividend Payable January 2, 1952		112,000.00
Other Bonds and Securities	467,964.85	Reserve for Taxes and Accrued Interest and Expenses		1,739,681.22
Loans and Discounts	96,966,167.06	Other Liabilities		77,634.29
Bank Premises	2,765,677.03	Capital Stock	$ 2,800,000.00	
Other Real Estate	116,797.60	Surplus	$12,200,000.00	
Customers' Liability Account of Acceptances	1,687,336.48	Undivided Profits	5,736,099.34	
Accrued Income and Other Assets	1,270,617.45			20,736,099.34
TOTAL	$410,113,739.44	TOTAL		$410,113,739.44

DESPOSITARY OF THE UNITED STATES GOVERNMENT, STATE OF LOUISIANA AND CITY OF NEW ORLEANS
MEMBER OF THE FEDERAL DEPOSIT INSURANCE CORPORATION

EQUIPMENT and SERVICE SUPPLIERS' NOTES

Executive Organizational Changes Announced By Baash-Ross Company

To keep pace with the steady expansion of the Baash-Ross Tool Company organization, L. F. Baash, president of the company, announced six major promotions in the company's executive personnel.

E. M. Gearke

F. L. Tooley

Glenn Johnson

H. Wotkyns

J. L. Dickmann

T. A. Boyd

Frank L. Tooley has been named executive vice president of the company, and T. A. Boyd, secretary-treasurer. Other vice presidents named are H. (Ink) Wotkyns, who will be in charge of Mid-Continent operations, and Glenn Johnson, in charge of research and development. E. M. Gearke was appointed general sales manager, and John L. Dickmann, chief engineer.

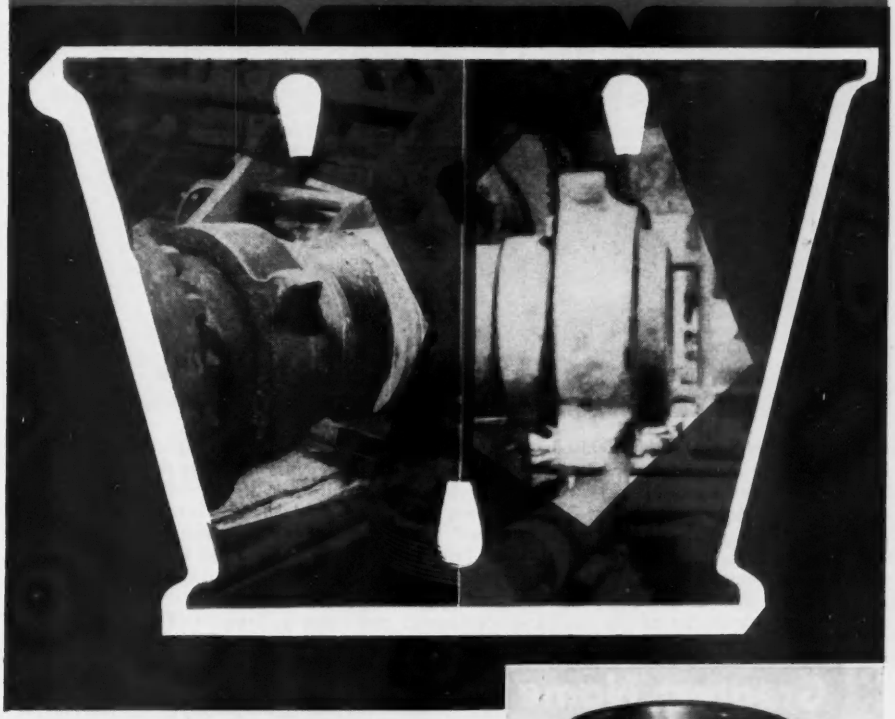
The Baash-Ross organization now has 17 manufacturing plants, regional shops and service headquarters throughout the nation's major oil territories.

B & W Inc. Appoints Hub Supply As Distributors for Ark-La-Tex

B & W Inc. has appointed Hub Supply Company (Pop Lewis and Nick Reeves), 211 Airport Drive, Shreveport, as sales and service representative for B & W products. The firm will serve East Texas, North Louisiana and Arkansas areas.

Hub Supply Company will maintain warehouse stocks of B & W Latch-On Centralizers with Kon-Kave Bows, Multi-Flex Scratchers and Wall Cleaning Guides.

The DOUBLE DUTY
WECO Fig. 400
SUCTION UNION

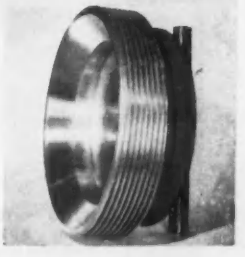


Designed especially for fast, simple, time and labor saving pump suction connections, the WECO FIG. 400 UNION also provides an efficient means for compounding mud pumps, thereby eliminating the need for special line blanking equipment. The 6", 7" O.D., 8" and 10" Fig. 400 unions can be furnished with a blanking plug which replaces the female sub when necessary to compound the pumps. It can be installed in a minimum of time.

This dual service feature makes the WECO FIG. 400 your most economical suction line connection. It is a 4000 p.s.i. test steel union with rugged ACME threads, available with ends threaded or bored for welding. The blanking plug is furnished with a convenient "T" handle for easy handling.

Get "Double-Duty" from your pump suction connections by using the WECO FIG. 400 SUCTION UNION.

For "Double-duty" service with Fig. 400 suction union you need only four parts, sub-ends, wing nut and blanking plug.



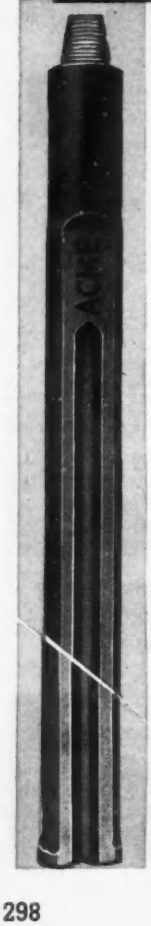
It's Wise to Standardize with... WECO ...

WELL EQUIPMENT MFG. CORP.
Subsidiary of Chiksan Company
HOUSTON 1, TEXAS
Exclusive Sales Representative Outside Mid-Continent Area
CHIKSAN COMPANY
Brea, Calif. Chicago 3, Ill. Newark 2, N. J.
Export Sales: CHIKSAN EXPORT COMPANY, Brea, Calif. Newark 2, N. J.

Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

(TOP) AN OPEN HOUSE for 5000 oil men presented this big new store and district warehouse of U. S. Steel's Oil Well Supply Division at Odessa, Texas. The warehouse will serve the entire Permian Basin area of Texas and all of New Mexico, and its stocks will back up "Oilwell's" branch stores at Monahans, McCamey, Denver City, Sundown, Big Spring, and Snyder, Texas; Hobbs, N. M., and the new Odessa store. The Odessa store will handle sales of the complete product line in the immediate Odessa-Midland area. (BOTTOM) THREE TOP OFFICIALS of Oil Well Supply Division chat with the manager of the new store. Left to right are Ralph W. Rager, vice president and administrative assistant to the president; Fred F. Murray, president of Oil Well Supply Division; Fred Wellman, manager of the store and warehouse; and Lloyd E. Tracy, vice president—sales.

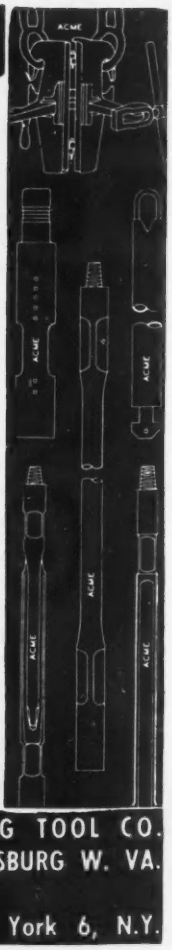
Greatest Name in Cable Tools



Acme

TRUSTWORTHY SINCE 1900

PETROLEUM EQUIPMENT SUPPLIERS' ASSOCIATION MEMBER



. . . to-be-Sure — Always Ask for Acme's Alloy Bits...

A most reasonable extra FIRST cost buys you ½-century's biggest bit buy. Delivers 50% or more actual in-hole action than any "regular" bit. Acme "Drilmor" ALLOY meets the increasing demand for a new type bit fully capable of cutting HARDEST formations; assuring more in-hole time.

Another feature (saving wasted out-time) is that Acme's Alloy Bit can be dressed and tempered in the field. And without special equipment; like "regular" bits. EXTREME, deeper penetrating hardness makes Acme's non-competitive Bits hold cutting edge, wear longer, resist battering, even in toughest going. They're longer life bits for your longer profit.

Write NOW for Alloy Bit's full facts and your copy Acme's latestCable Tool Catalog — containing proper field treatmeat of bits.

Fig. 108AA. Acme Alloy Bit. 51-years' specialized "know-how" makes it worth more to YOU.

ACME DRILLING & FISHING TOOLS

ACME FISHING TOOL CO.
PARKERSBURG W. VA.
Export Office:
19 Rector St., New York 6, N.Y.

Frank Crane Assumes Top Engineer Position With Martin-Decker Firm

Martin-Decker Corporation has appointed Frank Crane as chief engineer. After working in the drilling department of The Continental Oil Company of California, Crane was graduated from the Colorado School of Mines, where he majored in petroleum engineering. During the war he served in the Navy, and for the past six years, he has been division engineer at Los Angeles for Oil Well Supply Company.

Three Are Assigned to Baroid Sales Export and Advertising Positions

L. W. Jones has been promoted to export manager of Baroid Sales Division, National Lead Company, at Houston. In the Advertising department, Donald T. Fowler has been named manager, and James M. Bugbee, Jr., has been added to the department to assist in preparation of the firm's technical publications relating to oil well drilling muds, well logging, and testing equipment.

L. W. Jones

Jones began his oil field experience with Reed Roller Bit Company in 1934 and worked in major fields of Texas, Louisiana, and Oklahoma. Following overseas service with the Air Force, he joined Baroid in 1946 as a mud engineer. His initial assignment was in the Gulf Coast region, but he later spent considerable time in Mexico and South America as a consultant on unusual mud problems. Following his new appointment at Baroid, he visited Mexico City and Tampico to study new developments and problems in that area.

D. T. Fowler

J. M. Bugbee, Jr.

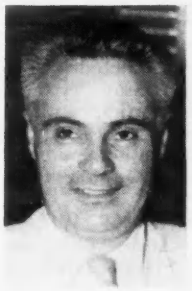
Experienced in the oil industry since 1940, Fowler was with Axelson Manufacturing Company, Byron Jackson Company and the Advertising department of Lane-Wells Company several years before joining Baroid. He was educated at the University of Southern California.

Bugbee, who was educated at the University of Texas, has been with Baroid since 1947. His previous experience includes well logging work in the southern half of the U. S. and mud engineering service in North Central Texas oil fields.

KIMRAY, INC., is planning an enlargement of its present 10,000 square foot Oklahoma City plant, into which the company moved in January, 1951. The company, which was started in August, 1948, with four employes, has outgrown its quarters with its expanded office, plant, designing and research departments. The plant is fully equipped with precision machines for making controls and regulators.

Schlumberger Well Surveying Makes Three Key Field Personnel Changes

Schlumberger Well Surveying Corporation has announced three important changes in its field personnel.



J. A. Bodin

R. D. Ford has been promoted to vice president and general manager of Schlumberger Surenco, which operates in South America. His headquarters will be in Caracas, Venezuela. Ford began his service with Schlumberger in July, 1936, and has worked in Bakersfield, Coalinga and Long Beach, Cal.

R. D. Ford

C. K. Ruddick

He also served for a period in the Houston headquarters before going to Tulsa in March, 1949 as area manager.

C. K. Ruddick has been made manager of the Mid-Continent area, comprising Kansas and Oklahoma, with headquarters in Tulsa. Ruddick joined Schlumberger in February, 1936. He has served in Illinois, Texas, and since May, 1949, in Tulsa as assistant manager of the Mid-Continent area.

J. A. Bodin has been made manager of the newly created West Texas area, which is comprised of the Permian Basin and North Texas Central divisions. The area office will be in Fort Worth. Bodin joined Schlumberger in France in January, 1933. In August, 1935, he transferred to the U. S. He has served successively as district manager at Hutchison, Kansas, McAllen, Texas, Houma, La., and Corpus Christi, Texas. During World War II, he served in the French Army, returning to Houston in July, 1941. He was connected with research projects until October, 1947, when he became chief field electrical engineer.

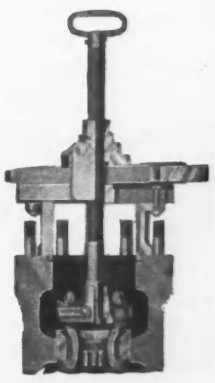
RED DEVIL
SLUSH PUMP VALVES

For high pressure abrasive service

In the manufacture of Red Devil Valves, particular emphasis has been given to HIGH PRESSURE ABRASIVE SERVICE at lowest possible operating costs. Their design is unique in simplicity, having only 5 parts. Valve and Seat are drop forged for maximum strength and processed for a deep high-carbon case to withstand excessive abrasive action. Seat has the least possible flow restriction and flat surface on bottom provides easy removal with Valve Seat Puller. "DIA-TEX" Inserts are Oil and Heat Resistant and can be reversed when worn on one side to double their long service life.

Write for Catalog No. P-110.

SPRING LOCK WASHER | VALVE INSERT PLATE | REVERSIBLE "DIA-TEX" VALVE INSERT | VALVE | VALVE SEAT



RED DEVIL VALVE SEAT PULLER

Provides a fast and positive means for pulling badly stuck valve seats by gripping the bottom rim of the seat. Eliminates the expense and hazards of removing seats with a cutting torch. All parts are made of highest grade alloy steel. Write for Catalog No. P-111.

CONSULT YOUR COMPOSITE. For full information on Red Devil Valves, Pullers and other Products, see Composite Catalog or write for price catalogs noted above. Red Devil Products are available through your supply store.

OIL WELL MANUFACTURING CORP.

6008 S. Alameda St., Los Angeles 1, Calif.

Only genuine RIDGID guarantees economy

This Work-Saver RIDGID assures you..."No pipe wrench housing repair expense."

• You'll find no substitute for the smart-working long-lasting qualities that have made the RIDGID the world's most popular pipe wrench. Breakproof housing, full-floating hookjaw with handy pipe scale, replaceable heeljaw, adjusting nut that spins easily in all sizes, 6" to 60", comfort-grip handle —these plus the RIDGID name mean more service and tool satisfaction for your money. Buy at your Supply House.

RIDGID

★ Work-Saver Pipe Tools ★

THE RIDGE TOOL CO. • ELYRIA, OHIO

NEW BOOKS

PIPING DESIGN AND ENGINEERING. Grinnell Company, Inc., Providence, R.I. $10.

The 221-page book was compiled for engineers engaged in designing piping for chemical, process and compressor plants. First part of the book is devoted to expansion and stresses in piping. This is followed by a section on flow calculations with nomographs. Next section describes and discusses materials used in piping. After a short section on pipe hangers and supports there follow 41 pages of general tables.

DANA'S SYSTEM OF MINERALOGY. Vol. II, revised by Charles Palache, the late Harry Berman, and Clifford Frondel. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16. $15.

Entirely rewritten and greatly enlarged, the new seventh edition of this standard work covers halides, nitrates, borates, carbonates, sulfates, phosphates, arsenates, tungstates, and molybdates. Information given includes classification, morphological and x-ray crystallography, habit, physical properties, optical properties, chemistry, occurrences, alterations, synthesis, name derivation, nomenclature, synomomy, and bibliographic references.

MAP OF WILLISTON BASIN. D. A. Austin Company, 1009 Commercial Standard Building, Fort Worth 2. $10.

The part of the Williston Basin within the U. S. is shown on this large map, which is drawn to the scale of about 1¼ inches equal 20 miles. Counties in the Basin states are keyed to the map in Austin's drilling report. Well locations are spotted, and geographical information, such as location of rivers, is included.

REVIEWS OF PETROLEUM TECHNOLOGY, Volume 11 (Covering 1949). The Institute of Petroleum, 26 Portland Place, London, W. 1, England. $4 postpaid.

A critical review of advancements in petroleum science and technology during 1949 is contained in the eleventh volume of this series. All phases of the oil industry are covered by the authors, who have thoroughly combed the technical literature published in 1949 to compile their reports. There are, in fact, references to nearly 3000 technical papers and articles. Several sections deal with petroleum geology, geophysics, drilling and production developments.

TOOL STEEL HANDBOOK, Allegheny Ludlum Steel Corporation, Pittsburgh 22, Penn. Free.

This 197-page volume, designed for engineers and metallurgists, begins with charts and tables giving specific and comparative data on properties, analyses and applications of tool steel. This is followed by detailed descriptions of all important grades of steels arranged alphabetically for easy reference. Other chapters deal with forms and finishes of tool and die steels. Final chapters cover techniques of heat treating and handling of tool and high speed steels.

What's NEW

In Perforating, Testing, and Fishing Tool Services

McCULLOUGH®
NEW SERVICES • NEW TOOLS
NEW WAYS OF DOING THINGS

Latest News About New Tools, Techniques and Services

LOST: One Test Well

***Idle for 15 years (was to be abandoned). Used for test purposes and accidentally perforated into unproductive oil sand. Produced 135 B/D through two strings of cemented casing after perforating with McCullough Glass Jet Perforator!**

Recent Field Results

McCULLOUGH GLASS JET and BURRLESS BULLET PERFORATORS

PROBLEM	GUN USED and CASING SIZES	RESULT
*1. **Dominguez, California.** Well used to test results of Glass Jet charge in new size, small O.D. Solid Steel Perforator Body. Shots to be fired in well idle for over 15 years. Well to be abandoned after our tests.	Special small O.D. McCullough Solid Steel Perforator Body with Glass Jet charges. Casing sizes: 6⅝″ 24 lb. and 8⅝″ 36 lb. Formerly shot with competitive perforators without results.	Sixteen shots fired, one at a time. Rise in fluid level stopped test. On pump, well produced 135 B/D!
2. **Shreveport, Louisiana.** Well had been shot two times with competitive perforators without results.	McCullough Burrless Bullet and McCullough Glass Jet Perforator with Steel Strip Carrier. 24 shots with each. 4½″ drill pipe. Sand formation.	After perforating bailer was run and when retrieved it was about ¾ full of oil. Time on job: one hour.
3. **Weesatche, Oklahoma.** Well only produced 3 B/D.	McCullough Glass Jet Perforator with Steel Strip Carrier. 12 holes shot through 6″ casing. Sand formation.	60 B/D reported by oil operator after perforating.
4. **San Angelo, Texas.** Drill stem test: 400 feet of free oil.	McCullough Glass Jet Perforator with Steel Strip Carrier. 4¾″ open hole. Strawn lime formation. 102 holes shot.	Steady flow of 50 B/D. Time on job: 3 hours.
5. **Cyril, Oklahoma.** New well.	McCullough Glass Jet Perforator with Steel Strip Carrier. 7″ casing. Sand formation. 279 holes shot.	240 B/D. 12 runs due to broken zones. Time on job: 13 hours.
6. **Kettleman Hills, California.** New zone.	McCullough Burrless Bullets. 6⅝″ casing. 300 holes shot.	250 B/D, an exceptionally good well for this area. Time on job: 5 hours.
7. **Oklahoma Wildcat.** New Well.	McCullough Glass Jet Perforator with Steel Strip Carrier. 7″ 20 lb. casing. Eight zones perforated with a total of 174 holes.	Production of 65 B/D much greater than anticipated. Time on job: 6½ hours.
8. **New Iberia, Louisiana.** New well.	McCullough Burrless Bullets. 6⅝″ 32 lb. casing. Sand formation. 60 holes shot.	Production not released but Engineer reported a very good well. Time on job: 3 hours.
9. **Houston, Texas.** Salt water in the hole. Competitive tester made three runs but couldn't fire gun.	McCullough Gun Tester with Burrless Bullets. 5½″ 17 lb. casing. 96 holes shot as ordered.	Satisfactory test job.
10. **Healdton, Oklahoma.** Well would not take acid.	McCullough Glass Jet Perforator with Steel Strip Carrier. 5½″ 17 lb. casing. 90 holes shot. Sand formation.	70 B/D. Time on job: 5 hours.

FOUND: The best way to complete oil wells—McCullough Perforating Service. The hardest shooting perforators in the world; better service; more oil; results even after all other methods fail!

Call your nearest McCullough Service Engineer for more information about results achieved in your area or about your particular problems. There is no obligation, yet you may save thousands of dollars and gain a better well.

For detailed technical reasons why McCullough Perforators get such outstanding results, write for the McCullough section of the Composite Catalog or ask your McCullough Service Engineer for a free copy.

PERFORATING, TESTING AND FISHING SERVICE ANYWHERE — ANYTIME!

McCULLOUGH TOOL COMPANY

5820 South Alameda Street, Los Angeles 58, California
405 McCarty Street (P.O. Box 2575) • Houston, Texas

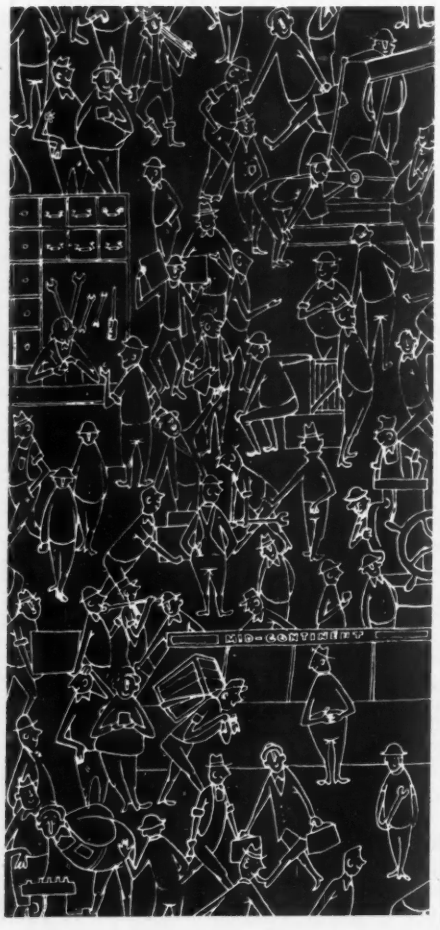
CANADA: Edmonton, Alberta • **EXPORT OFFICE:** Los Angeles, California
VENEZUELA: United Oilwell Service Co., S.A.; Caracas, Anaco, Maracaibo

SERVICE LOCATIONS: **TEXAS:** Houston, Snyder, Alice, Cisco, Corpus Christi, McAllen, Odessa, Tyler, San Angelo, Victoria, Wichita Falls. **OKLAHOMA:** Oklahoma City, Guymon, Healdton. **MISSISSIPPI:** Laurel. **NEW MEXICO:** Hobbs. **KANSAS:** Great Bend. **WYOMING:** Casper: **CALIFORNIA:** Los Angeles, Avenal, Bakersfield, Ventura. **LOUISIANA:** Houma, Lake Charles, New Iberia, Shreveport. **COLORADO:** Sterling.

Mid-Continent NEWS and HUMOR?

Typical Activity . . .

. . . in one of Mid-Continent's bustling, well stocked field stores where the men of the oil industry know that they can find the finest equipment, the best in service and the tops in consideration of their supply problems. No problem is too big—or too small—for these happy Mid-Continent characters . . . matter of fact, they will probably have a joke or two to pass on from the Humor Section of the Mid-Continent NEWS. Make your next supply stop the Mid-Continent store nearest you!



MID-CONTINENT Supply Company

General Offices Mid-Continent Bldg. FORT WORTH, TEXAS

SQUEAKS FROM THE BULLWHEEL

Stock Plan

"I can't live with my wife any longer," the embittered husband complained to a friend. "She wants to keep a goat in our bedroom."

"Well," said the friend, trying to be helpful, "I wouldn't let that upset me. Just open the windows."

"What!" exclaimed the husband, "and let my pigeons fly out?"

Wool's Worth

"I represent the Mary's Lamb Wool Company, madam. Would you be interested in some coarse yarns?"

"Well, yeah, if they're good ones, I might listen to a couple."

Injured Pride

A Bostonian was showing an Englishman the sights of his native city and finally took him out to the Bunker Hill monument

"This is where our great General Warren fell, you know," he explained.

The Englishman looked pensively up at the tall shaft.

"Nasty drop! Killed him, of course?"

Breakthrough

A colonel driving a jeep through a small town ran through an open air market and accidentally knocked over a barrel of potatoes, a case of apples, some oranges, and a bushel of onions. He finally stopped half-way down the block and looked back. The merchant was standing in the middle of the street by a case of eggs. He yelled: "Don't bother to come back. I'll kick the damn eggs over myself."

First Blush of Youth

A bashful young man had been presented to a very modern young girl and for ten minutes he sat speechless, growing redder and redder and more embarrassed.

At length the girl said sweetly: "And now let's talk of something else."

". . . Now, don't forget . . . Take the log to the main office, give 'em the order for more cable and pipe, and bring back the latest issue of WORLD OIL and a ham and rye."

Rural Engineering

The old mountaineer grandpa was sitting in his favorite old rocker on the porch of his little cabin. He was slowly rocking east and west. Sitting, nearby, rocking north and south, was his 42-year-old son.

"Sonny boy," drawled the old man. "It's about time you learned not t'wear yerself out thataway. Rock the way the boards run and save yer stren'th."